FUEL SUPPLY

ACCELERATOR LINKAGE

Accelerator linkage, servicing

NOTE: Components marked with * are checked via On Board Diagnostic (OBD). See DIAGNOSTIC MODE 3: CHECK DTC MEMORY .

NOTE: The following list refers to Fig. 1 .

1. **Mounting bracket**
2. **Connector**
   - Black, 6-pin
3. **10 Nm**
4. **Throttle Position (TP) Sensor -G79- and Sender -2- for accelerator pedal position -G185-***
   - Not adjustable.
   - Throttle Position (TP) sensor communicates the driver's intentions to the control module for Diesel-Direct fuel injection system
   - To remove sensor, remove cover in footwell
   - Checking. See **THROTTLE POSITION (TP) SENSOR, CHECKING** .
5. **Bracket**
   - for footwell cover
   - for model year 2002 and up
   - clipped in at Throttle Position (TP) Sensor
6. **Bracket**
   - for footwell cover
   - for up to model year 2001
   - clipped in at Throttle Position (TP) Sensor

Fig. 1: Identifying Accelerator Linkage Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Throttle Position (TP) sensor, checking

Recommended special tools and equipment

- VAG1526 multimeter or VAG1715 multimeter
- VAG1594 connector test kit
- Wiring diagram

Test requirement

- The respective fuses of Diesel-Direct fuel injection system must be OK:

Fig. 2: Identifying Fuses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Fuse holder is located behind access panel at far left end of dash.

Function

Both the Throttle Position (TP) Sensor -G79- and the Sender -2- for accelerator pedal position -G185- are located at the accelerator pedal and communicate the driver's intentions to the control module for Diesel-Direct

fuel injection system completely independently of each other. Both sensors are installed in one housing.

Test sequence

NOTE: When servicing terminals in the harness connector for the Throttle Position (TP) Sensor, use only gold-plated terminals.

- Remove footwell cover (driver's side).
- Disconnect 6-pin connector from Throttle Position (TP) Sensor.
- Switch ignition on.

Checking voltage supply and wiring to control module

- Connect multimeter to the following connector terminals for voltage measurement.

  Terminal 1 + Ground (GND)

  Terminal 1 + 5

  Terminal 2 + Ground (GND)

  Terminal 2 +3

  Specified value: at least 4.5 V

Fig. 3: Identifying Throttle Position And Accelerator Position Sensor Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ignition off.

If specified values are not obtained:

- Connect test box to control module wiring harness. See **TEST BOX, CONNECTING FOR WIRING TEST** .

Vehicles with 80-pin control module

- Check for open circuits in wires between test box and connector according to wiring diagram.

  Terminal 2 + socket 11

  Terminal 3 + socket 23

  Terminal 4 + socket 24

  Terminal 5 + socket 12

  Terminal 6 + socket 25 Vehicles with automatic transmission

  Terminal 1 + socket 8

  Wire resistance: max. 1.5 ohm

Fig. 4: Identifying Throttle Position And Accelerator Position Sensor Harness Connector Terminals (80-Pin ECM)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with 121-pin control module

- Check for open circuits in wires between test box and connector according to wiring diagram.

  Terminal 2 + socket 12

  Terminal 3 + socket 50

  Terminal 4 + socket 69

  Terminal 5 + socket 70

  Terminal 6 + socket 51 Vehicles with automatic transmission

Terminal 1 + socket 63

Wire resistance: max. 1.5 ohm

Fig. 5: Identifying Throttle Position And Accelerator Position Sensor Harness Connector Terminals (121-Pin ECM)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Continuation for all vehicles

- Also check wires for short circuit to each other, to vehicle Ground (GND) and to B+.

Specified value: INFINITY ohm

If no malfunction is detected in the wiring and if the voltage supply was OK:

- Replace accelerator pedal position sensor. See item 4 .
- Erase DTC memory of control module for Diesel - Direct fuel injection system. See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

FUEL SUPPLY SYSTEM COMPONENTS, REMOVING AND INSTALLING

NOTE:

- **Hose connections are secured with either spring-type or clamp-type clips.**
- **Always replace clamp-type clips with screw-type clips.**
- **Fuel hoses in engine compartment must only be secured with spring-type clips. The use of clamp or screw-type clips is not permissible.**
- **Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.**

- Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .
- Observe rules for cleanliness. See **RULES OF CLEANLINESS** .

Removing and installing fuel tank with its attachments and fuel filter. See **FUEL TANK WITH ATTACHMENTS AND FUEL FILTER, REMOVING AND INSTALLING** .

Observe crash fuel shut-off. See **CRASH FUEL SHUT-OFF** .

Electronic Engine Power Control (EPC) system, checking. See **ELECTRONIC ENGINE POWER CONTROL (EPC) SYSTEM COMPONENTS, CHECKING** .

Servicing parts of the Evaporative Emission (EVAP) system. See **EVAPORATIVE EMISSION (EVAP) SYSTEM COMPONENTS, SERVICING** .

FUEL TANK WITH ATTACHMENTS AND FUEL FILTER, REMOVING AND INSTALLING

NOTE: The following list refers to items in Fig. 1 .

1. **Sealing cap**
   - Secured with strap from MY 2000
2. **Seal**
   - Replace if damaged
3. **Securing screw**
4. **Tank flap unit**
   - With rubber cup
5. **Vent pipe**
   - Black
   - Check securely seated

- Clipped onto top of fuel tank

6. **Ground connection**
   - Check securely seated
7. **Vent pipe**
   - White
   - Check securely seated
   - Checking. See **Checking Change-Over Valve**
8. **Gravity/overflow valve**
   - To remove valve unclip upward out of support
   - Check valve for throughflow:
     - Valve vertical: open
     - Valve tilted 45°: closed
9. **O-ring**
   - Replace if damaged
10. **Change-over valve**
    - To remove valve, unclip sideways out of support.
    - Before installing remove sealing cap item 1.
    - Checking. See **Checking Change-Over Valve**
11. **Vent pipe**
    - Black
    - Check securely seated
    - To EVAP canister. See **EVAPORATIVE EMISSION (EVAP) SYSTEM, OVERVIEW** , Pos.6
    - To remove from flange, press release button on connecting piece.
12. **Pressure retaining valve**
    - For fuel tank breathing
    - Checking. See **Checking Pressure Retaining Valve**
13. **Vent pipe**
    - Black
    - Check securely seated
    - Secure with spring-type clips
14. **Fuel tank**
    - Support with engine and transmission jack VAG 1383 A when removing
    - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
15. **Clamping washer**
16. **Heat shield**
    - For fuel tank
17. **25 N.m**

18. **Lock nut, 2 N.m**
19. Fuel tank cover
20. Securing strap
    - Note differing length
    - Installation position: Fixing point (holes) point in direction of travel
21. **Supply pipe**
    - Black
    - Check securely seated
    - Press disengaging tabs at connecting piece to pull off fuel filter
    - To fuel supply hose on fuel rail:

      See Fuel Rail With Injectors, Disassembling And Assembling .

22. **Fuel filter**
    - Installation position: -arrow- points in throughflow direction
23. **Screw-type clip**
24. **Vent pipe**
    - White
    - Check securely seated
    - Clipped onto side of fuel tank
    - To EVAP Canister Purge Regulator Valve -N80-
25. **Sealing ring**
    - Replace if damaged
    - When installing, insert seal "dry" into fuel tank opening
    - Only coat with fuel when installing fuel delivery unit flange
26. **Fuel delivery unit**
    - Note installation position on fuel tank. See **Installation Position Of Fuel Delivery Unit Flange**
    - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
    - Removing and installing fuel gauge sensor. See **FUEL GAUGE SENSOR, REMOVING AND INSTALLING**
    - Checking fuel pump. See **FUEL PUMP, CHECKING**
    - Clean strainer if soiled
27. **Union nut, 75 N.m**
    - Remove and install with spanner 3217
28. **Supply pipe**
    - Black
    - Check securely seated
    - Clipped onto side of fuel tank

- To remove from flange and fuel filter press release button on connecting piece

29. **Return pipe**
    - Blue or blue markings
    - Clipped onto side of fuel tank
    - Check securely seated
    - To remove from flange press release button on connecting piece
    - From fuel return pipe on fuel rail

    See Fuel Rail With Injectors, Disassembling And Assembling .

30. **Connector**
    - Black, 4-pin
    - For Fuel Gauge sensor -G- and Fuel Pump -G6-
31. **10 N.m**

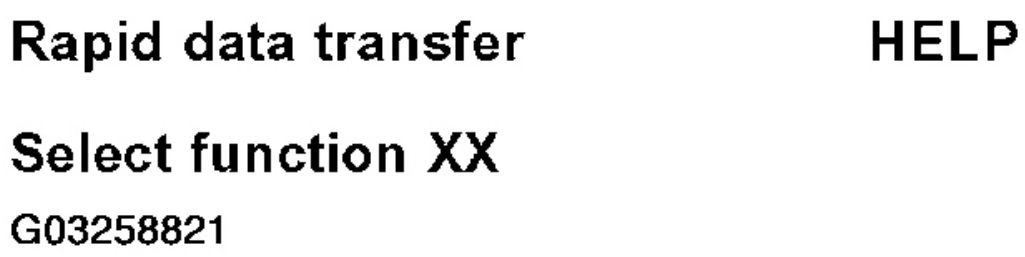


Fig. 1: Exploded View Of Fuel Supply System Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installation Position Of Fuel Delivery Unit Flange

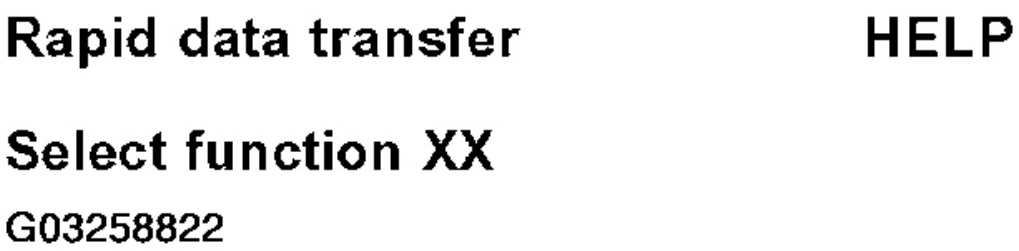


Fig. 2: Identifying Installation Position Of Fuel Delivery Unit Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Marking on sensor must align with the marking on fuel tank -arrows-.

Blue or blue marked return pipe -1- to connection with identification -R-.

Black supply pipe -2- to connection with identification -V-.

NOTE: After installing fuel delivery unit flange, check that the supply, return and breather pipes are still clipped onto the fuel tank.

Checking Change-Over Valve

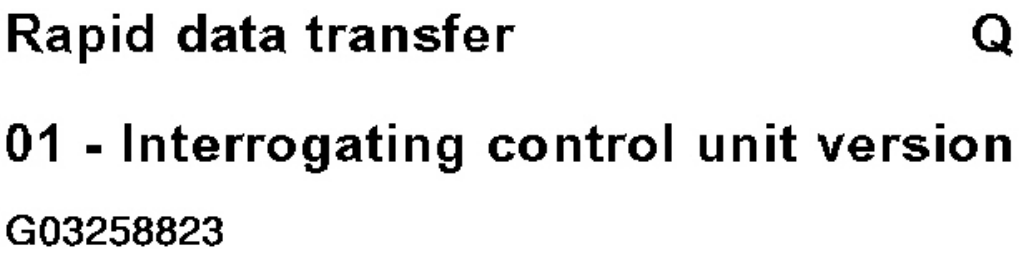


Fig. 3: Checking Change-Over Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Valve in rest position: Closed

Valve pushed in direction of arrow: Open

NOTE: Before installing change-over valve, unscrew cap from fuel tank.

Checking Pressure Retaining Valve

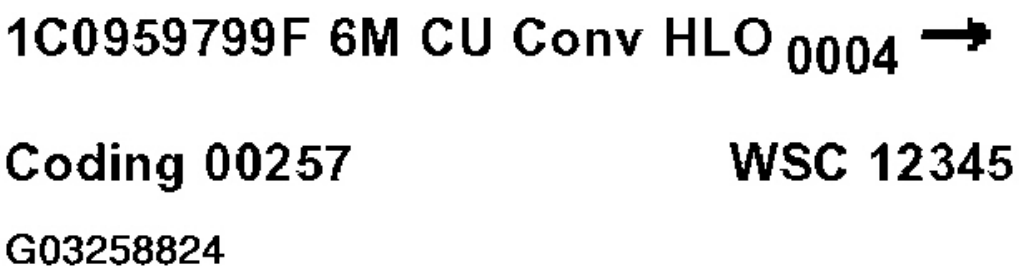


Fig. 4: Checking Pressure Retaining Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Pressure retaining valve is open from EVAP canister and from Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- in both flow directions -arrow- -1-.

From gravity valve side, it is only open in one flow direction -arrow- -2-.

SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM

CAUTION: When doing any repair work, especially in the engine compartment, due to the cramped conditions, pay attention to the following:

- Route all sorts of hoses/lines (e.g. for fuel, hydraulics, evaporative emissions system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.
- Make sure sufficient clearance to all moving or hot components.

WARNING: Fuel supply hoses are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

When removing and installing the fuel gauge sensor or fuel pump (fuel delivery unit) from a full or partly full fuel tank the following must be observed:

- Before commencing work, switch on exhaust extraction system and place an extraction hose close to the

sensor opening in the fuel tank to extract escaping gas fumes. If no exhaust extraction system is available, a radial fan (as long as motor is not in air flow) with a displacement greater than 15 m^3 /h can be used.

- Prevent skin contact with gasoline! Wear fuel resistant gloves!
- For safety reasons, remove fuse 28 from fuse holder before opening fuel system because fuel pump can be activated via driver side door contact switch.

Fig. 5: Identifying Location Of Fuse 28
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Fuse box is located behind access panel at far left end of dash.

RULES OF CLEANLINESS

When working on the fuel supply/injection system, pay careful attention to the following 5 rules:

- Thoroughly clean all unions and the adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- Carefully cover opened components or seal, if the repair cannot be carried out immediately.
- Only install clean components: only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

FUEL DELIVERY UNIT, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1332 Torque wrench (40-200 N.m)

Fig. 6: Identifying VAG 1332 Torque Wrench (40-200 N.m)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- 3217 Ring nut wrench

Fig. 7: Identifying 3217 Ring Nut Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Note safety precautions before starting work. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Remove cover under bench seat.
- Pull 4-pin connector and supply and return pipes off flange.

> **WARNING: Fuel supply hoses are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.**

- Remove union nut with 3217 wrench.

1Y1959802A Door control unit FPS KLO 0001 →

G03258828

Fig. 8: Removing Union Nut With 3217 Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull fuel delivery unit and seal out of opening in fuel tank.

NOTE: If the delivery unit is to be replaced then drain old delivery unit before disposal.

Installing

Installing the fuel delivery unit is carried out in the reverse order.

NOTE:

- **When inserting the fuel delivery unit make sure that the fuel gauge sensor is not bent.**
- **Insert flange seal of fuel delivery unit into the fuel tank opening in dry condition.**
- **Only coat with fuel when installing fuel delivery unit flange.**
- **Ensure fuel hoses are seated securely.**
- **Secure fuel hoses with spring-type clamps.**
- **Note installation position of fuel delivery unit flange: the marking on flange must align with marking on fuel tank -arrows-.**

Please wait

G03258829

Fig. 9: Aligning Marking On Flange With Marking On Fuel Tank

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- **After installing fuel delivery unit, check that the supply, return and vent pipes are still clipped onto fuel tank.**

- Perform work sequence "Procedure after voltage supply open circuit".

  See Procedure After Correcting Voltage Supply Open Circuit .

- Check DTC memory and read readiness code:

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Match engine electronics control module to throttle valve control module:

  See Engine Control Module (ECM) To Throttle Valve Control Module, Adapting .

FUEL GAUGE SENSOR, REMOVING AND INSTALLING

Removing

- Remove fuel delivery unit. See **RULES OF CLEANLINESS** .
- Release and pull off terminals for wires -3- and -4-.

Fig. 10: Pulling Off Terminals For Wires -3- And -4-
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Lift retaining tabs -1- and -2- with a screwdriver and pull fuel gauge sensor out downward -arrows-.

Installing

- Insert fuel gauge sensor in guides on fuel delivery unit and push up until it engages.

FUEL TANK, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1383 A Engine/transmission jack

Fig. 11: Identifying VAG 1383 Engine/Transmission Jack
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1331 Toque wrench (5-50 N.m)

Fig. 12: Identifying VAG 1331 Toque Wrench (5-50 N.m)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Note safety precautions before starting work. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .
- First check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Open fuel flap.
- Remove rear right wheel housing liner.

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW**

- Remove rear axle.

See **AXLE BEAM**

- Drain fuel tank and clean fuel filler neck and surrounding area.
- Unscrew securing bolts and remove tank flap unit with rubber cup.
- Remove securing bolt on filler neck.
- Fold rear seat bench forward.
- Remove fuel gauge sensor cover plate and disconnect connector.
- Remove cover from under fuel tank.

WARNING: Fuel supply hoses are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Disconnect return hose -2- (blue), supply hose -1- (black) and breather hose -3- (white) at connecting point.

NOTE: Press buttons on hose couplings to do this.

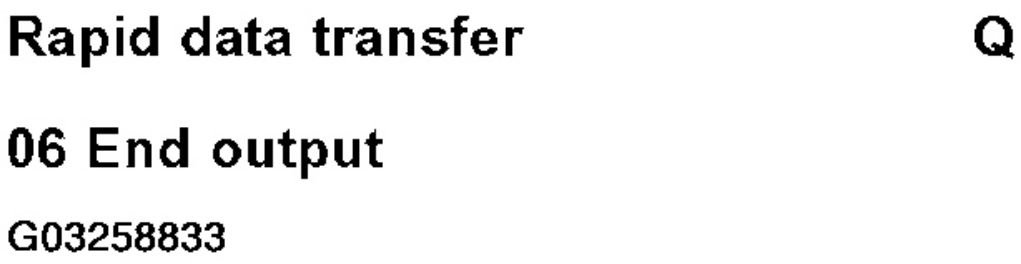


Fig. 13: Disconnecting Return Hose, Supply Hose And Breather Hose At Connecting Point
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove tensioning strap. When doing this support fuel tank with engine/transmission jack VAG 1383 A.
- Lower fuel tank.

Installing

Installation is carried out in the reverse order; when doing this note the following:

- Breather hoses are to be installed kink-free.
- Fuel hoses are to be installed kink-free.

- Make sure fuel hoses are seated securely.
- Secure fuel hoses with spring-type clamps.
- Do not interchange supply and return hose (return hose blue or blue markings, supply hose black).

NOTE: After installing the fuel gauge sensor, check that the supply, return and breather pipes are still clipped onto the fuel tank.

- Check DTC memory.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Read readiness code.

  See Readiness Code, Displaying .

- Match engine electronics control module to throttle valve control module.

  See Engine Control Module (ECM) To Throttle Valve Control Module, Adapting .

REPLACEMENT FUEL TANKS, INSTALLING GROUND STRAP

Condition

All replacement fuel tanks do not come with ground strap (wire) installed.

Installing

NOTE: The ground strap must be installed into all replacement fuel tanks.

CAUTION: Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.

Install ground strap Part No. 1 J0 201 184 into replacement fuel tank as follows:

- Remove fuel filler cap and observe cautions printed on cap.
- Bend up tab on inside of fuel filler pipe as shown -arrow-.

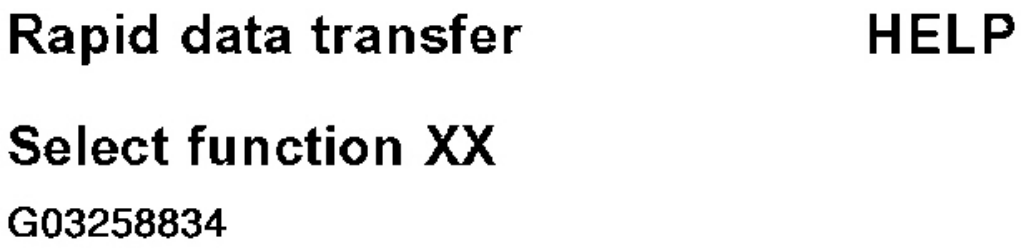


Fig. 14: Bending Up Tab On Inside Of Fuel Filler Pipe
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Illustration shows ground strap already installed.

- Insert end -A- of ground strap through slot in tab up to bend -B- at other end of strap.

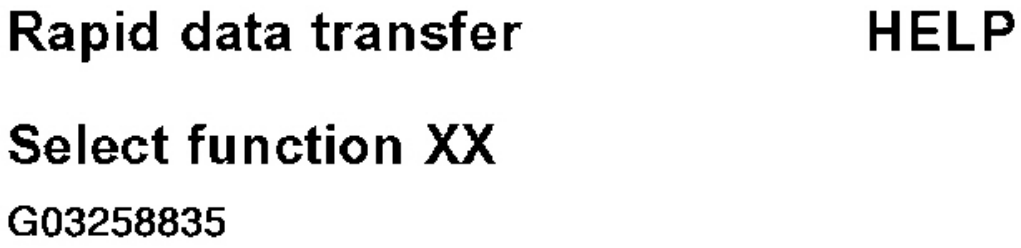


Fig. 15: Inserting End -A- Of Ground Strap Through Slot In Tab Up To Bend -B- At Other End Of Strap
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Bend down tab on inside of fuel filler pipe. This will secure strap to end of tab.
- Reinstall fuel filler cap.

CRASH FUEL SHUT-OFF

Function

Vehicles with an airbag are equipped with a crash fuel shut-off system. It reduces the danger of a fire in a crash

as the fuel pump is switched off via the fuel pump relay.

Simultaneously this system provides an improved start for the engine. When the door is opened the fuel pump is activated for 2 seconds to build-up the pressure in fuel system.

When opening the fuel system:

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .

- Check activation of fuel pump relay using wiring diagram and VAG1466 A:

  See appropriate WIRING DIAGRAM article

FUEL PUMP, CHECKING

Special tools and equipment

- 3217 Ring nut wrench
- VAG 1348/3A Remote control with VAG 1348/3-2 adapter cable
- VAG 1466 Test system
- VAG 1527 BLED test light
- VAG 1594 A Adapter set
- VAG 1715 Multimeter

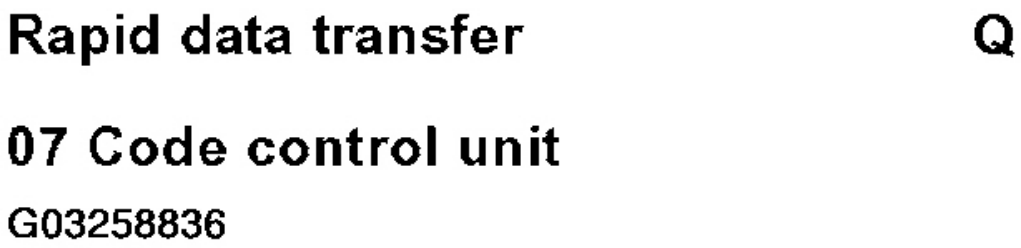


Fig. 16: Identifying Special Tools And Equipment (1 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1318 Pressure tester
- VAG 1318/1 Adapter
- VAG 1318/11 Adapter

- VAG 1318/17 Adapter
- VAG 1318/23 Adapter
- VAG 1332 Torque wrench (40-200 N.m)
- Measuring container
- Wiring diagram

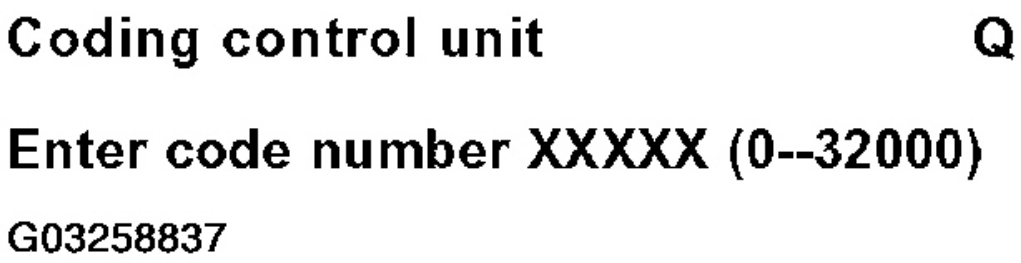


Fig. 17: Identifying Special Tools And Equipment (2 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Test conditions

- Battery voltage at least 11.5 V
- Fuse No. 28 OK

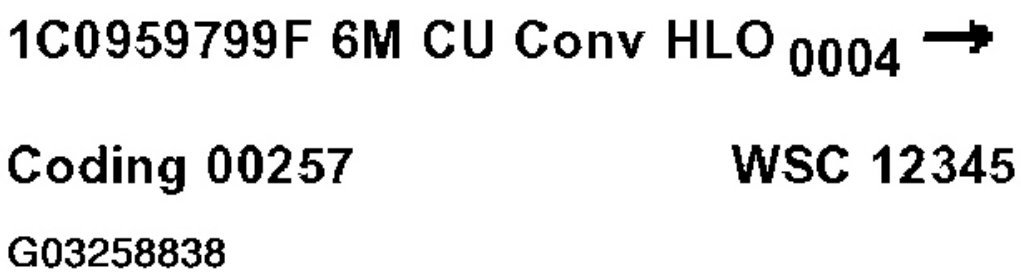


Fig. 18: Identifying Location Of Fuse No. 28
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- All electrical consumers, e.g. lights and rear window defroster must be switched off.

- If the vehicle is equipped with an air conditioner, this must be switched off.

NOTE: Observe description of function of crash fuel shut-off. See CRASH FUEL SHUT-OFF .

Checking function and voltage supply

NOTE: Check whether a coded radio is installed as during the forthcoming work sequences the battery Ground strap must be disconnected. Obtain radio code first if necessary.

- Remove cover from fuel delivery unit.
- Briefly operate starter.

  Fuel pump must be heard to run.

- Switch ignition off.

If the fuel pump does not run:

- Remove cover in front of fuse holder.
- Pull fuse No. 28 out of fuse holder.

Fig. 19: Connecting Remote Control VAG 1348/3A With Adapter Cable VAG 1348/3-2 To Terminal 28A
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect remote control VAG 1348/3A with adapter cable VAG 1348/3-2 to terminal 28a to fuel pump and battery positive (+).
- Operate remote control.

Fuel pump runs:

- Check activation of fuel pump relay using wiring diagram:

  See appropriate WIRING DIAGRAM article

Fuel pump does not run:

- Pull 4 pin connector off flange on fuel delivery unit.
- Connect LED test light VAG 1527 B with auxiliary cables from VAG 1594 A to outer terminals of connector.

Fig. 20: Connecting LED Test Light VAG 1527 B With Auxiliary Cables From VAG 1594 A To Outer Terminals Of Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate remote control.

  LED must light up

LED does not light up:

- Locate and eliminate open circuit using wiring diagram:

See appropriate WIRING DIAGRAM article

LED lights up (voltage supply OK.):

- Remove union nut with 3217 wrench.

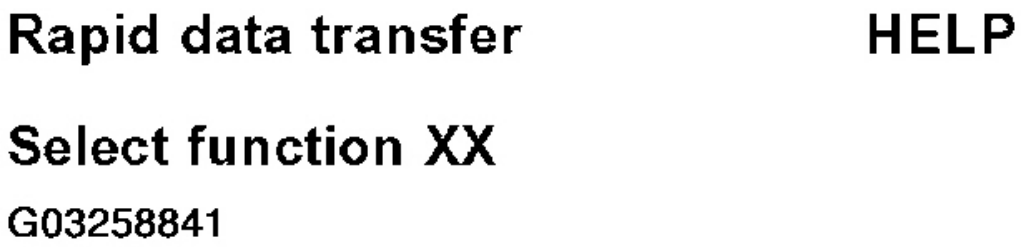


Fig. 21: Removing Union Nut With 3217 Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check that electrical wires between flange and fuel pump are connected.

If no open circuit can be found:

- Fuel pump malfunctioning, replace fuel delivery unit. See **RULES OF CLEANLINESS** .

Checking delivery rate

Test conditions

- Voltage supply OK
- Remote control VAG 1348/3A connected

Test sequence

- Remove filler cap from fuel tank filler neck.

> **WARNING: Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.**

- Pull off supply pipe/hose -1- and collect leaking fuel with a cloth.

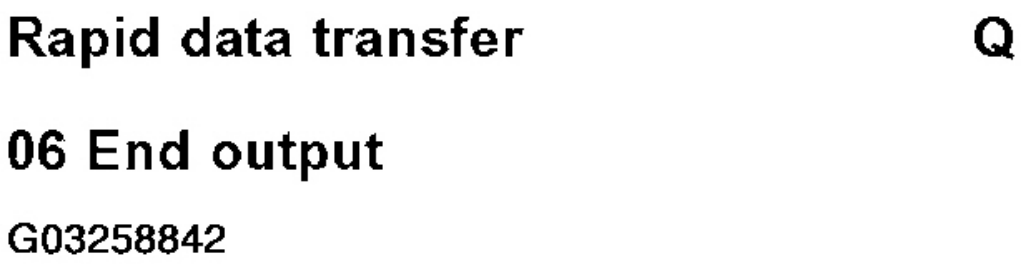


Fig. 22: Pulling Off Supply Pipe/Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect pressure gauge VAG 1318 with adapter 1318/23 and VAG 1318/17 to fuel supply hose.

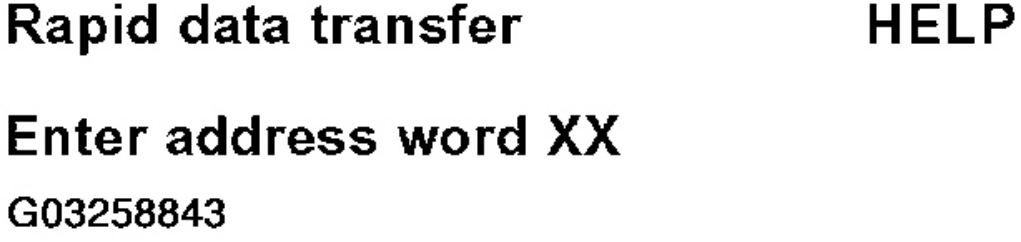


Fig. 23: Connecting Pressure Gauge VAG 1318 With Adapter 1318/23 And VAG 1318/17 To Fuel Supply Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Push hose VAG 1318/1 onto adapter VAG 1318/11 on pressure gauge and hold hose in a measuring container.
- Open pressure gauge cut-off tap. Lever then points in throughflow direction -A-.
- Operate remote control VAG 1348/3A and slowly close cut-off tap, until pressure gauge shows 3 bar. From this point on do not move position of cut-off tap.
- Empty measuring container.
- Fuel pump delivery range is dependent upon battery voltage. Therefore, connect multimeter with adapter cables from VAG 1594A to vehicle battery.
- Operate remote control for 30 seconds and measure battery voltage.

- Compare quantity of fuel delivered with specification.

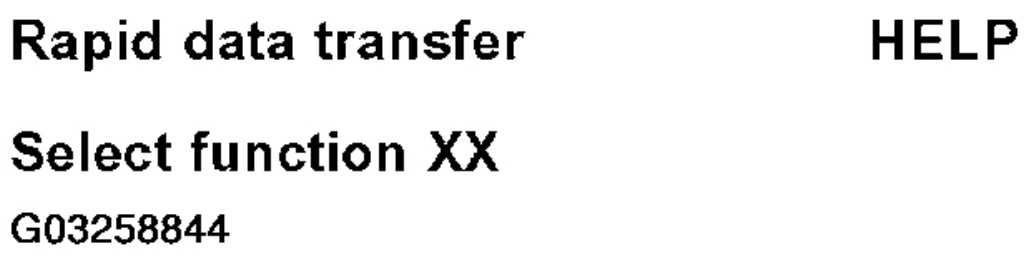


Fig. 24: Minimum Delivery V/S Voltage Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

*) Minimum delivery cm^3 /30 seconds

**) Voltage at fuel pump with engine stationary and pump running (approx. 2 volts less than battery voltage).

Example:

During the test a voltage of 12.5 volts is measured at the battery. As the voltage at the pump is approx. 2 volts less than the battery voltage then this will equate to a minimum delivery of 200 cm^3 /30 s.

If the minimum delivery rate is not attained:

- Check fuel lines for possible restrictions (kinks) or blockages.
- Pull supply hose off fuel filter inlet.
- Connect pressure gauge VAG 1318 with adapter 1318/17 to fuel supply hose.

Fig. 25: Connecting Pressure Gauge VAG 1318 With Adapter 1318/17 To Fuel Supply Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Repeat delivery rate check.

If the minimum delivery rate is now attained:

- Replace fuel filter.

If the minimum delivery rate is again not attained:

- Remove fuel delivery unit and check strainer filter for soiling.

  Only when up to now no malfunction has been detected:

- Fuel pump malfunctioning, replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
- Check DTC memory:

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Read readiness code:

  See Readiness Code, Displaying .

  If the DTC memory has been erased or the Engine Control Module separated from the permanent (battery) positive, the readiness code must be generated again.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

  If the delivery rate has been attained but nevertheless a fuel supply system malfunction is suspected (e.g. intermittent failure of fuel supply system), check the current draw of the fuel pump as follows:

- Reconnect all disconnected fuel hoses.
- Connect multimeter VAG 1715 to wire -arrow- for terminal 1 of 4-pin connector using pick-up clamp.

G03258846

Fig. 26: Connecting Multimeter VAG 1715 To Wire For Terminal 1 Of 4-Pin Connector Using Pick-Up Clamp
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Start engine and run at idling speed.
- Measure current draw of fuel pump.

  Specification: max. 8 amps.

NOTE: If the fuel system malfunction is intermittent, you can perform the check during a test drive, to do this a 2nd person is necessary.

Observe the valid safety precautions when performing a road test.

See Safety Precautions .

If the current draw is exceeded:

- Fuel pump malfunctioning, replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
- Check DTC memory:

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Read readiness code:

  See Readiness Code, Displaying .

If the DTC memory has been erased or the Engine Control Module separated from the permanent (battery) positive, the readiness code must be generated again.

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

Checking fuel pump non-return valve

Test conditions

- Remote control VAG 1348/3A is still connected
- Pressure gauge VAG 1318 is still connected

Test sequence

NOTE: With this check the fuel supply line connections from the fuel delivery unit to the point at which the pressure gauge VAG 1318 is connected will be checked for leaks at the same time.

- Close pressure gauge cut-off tap (lever at right angles to throughflow direction - position -B-).

Fig. 27: Closing Pressure Gauge Cut-Off Tap (Lever At Right Angles To Throughflow Direction - Position -B-)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Separate remote control at short intervals, until a pressure of approx. 3 bar has built up.

WARNING: Danger of spray when opening the cut-off tap, hold container over the pressure gauge free connection.

- If pressure builds up too high, lower excess pressure by carefully opening cut-off tap.
- Watch pressure drop on gauge. After 10 minutes pressure must not drop below 2.5 bar.

If the pressure drops further:

- Check line connections for leaks.

If no wiring malfunction is detected:

- Fuel pump malfunctioning, replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
- Check DTC memory:

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Read readiness code:

See Readiness Code, Displaying in ENGINE PERFORMANCE.

If the DTC memory has been erased or the Engine Control Module separated from the permanent positive, the readiness code must be generated again.

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing in ENGINE PERFORMANCE.

ELECTRONIC POWER CONTROL (EPC) SYSTEM

EPC SYSTEM, FUNCTION

With the EPC system the throttle valve is not operated by a cable. There is no mechanical connection between accelerator and throttle valve.

The position of the accelerator is transmitted to the Engine Control Module by two throttle position sensors (variable resistors together in a housing) which are connected to the accelerator pedal.

The position of the accelerator (drivers requirement) is the main input value for the Engine Control Module.

The throttle valve is operated over the complete revolution and load range by an electric motor (throttle valve positioner) in the throttle valve control part.

The throttle valve is operated by the throttle valve positioner which is controlled by the Engine Control Module.

When the engine is not running and the ignition is switched on the Engine Control Module moves the throttle valve exactly as prescribed by the throttle position sensor. This means that when the accelerator is depressed halfway the throttle valve positioner opens the throttle valve by the same amount, the throttle is then approximately half open.

When the engine is running (under load) the Engine Control Module can open or close the throttle valve independently of the throttle position sensor.

This means that the throttle valve can already be completely open even though the accelerator pedal is depressed half way.

This also gives vastly improved consumption and exhaust emission levels at certain load conditions.

The torque required by the engine can be produced by the Engine Control Module by optimizing the

combination of throttle valve cross-section and charge pressure.

It is incorrect to believe that the "EPC" is comprised of one or two components only. The EPC is a system, which is comprised of all components which have an influence, control or monitor the position of the throttle valve, e.g. the throttle position sensor, the throttle valve control module, the EPC warning lamp, the Engine Control Module.

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES OF CLEANLINESS** .

ELECTRONIC ENGINE POWER CONTROL (EPC) SYSTEM COMPONENTS, CHECKING

NOTE: The following list refers to items in Fig. 28 .

1. **Bracket**
2. **Connector**
   - Black, 5 pin
3. **10 N.m**
4. **Throttle Position (TP) sensors -G79- and -G185-**
   - Not adjustable
   - Both sensors encompassed within one assembly
   - TP sensors -G79- and -G185- communicate driver's intentions to control module
   - To remove sensors, remove cover in footwell
   - When removing remove instrument panel and pedal cluster cover
   - Checking. See **THROTTLE POSITION (TP) SENSORS -G79- AND -G185-, CHECKING**
   - If replaced, adapt control module for automatic transmission using scan tool. See **BASIC SETTING, INITIATING** .
5. **Retainer**
   - For footwell cover
   - From Model Year 2002
   - Clipped onto accelerator pedal
6. **Bracket**
   - For cover in footwell
   - Through Model Year 2001
   - Clipped onto accelerator pedal

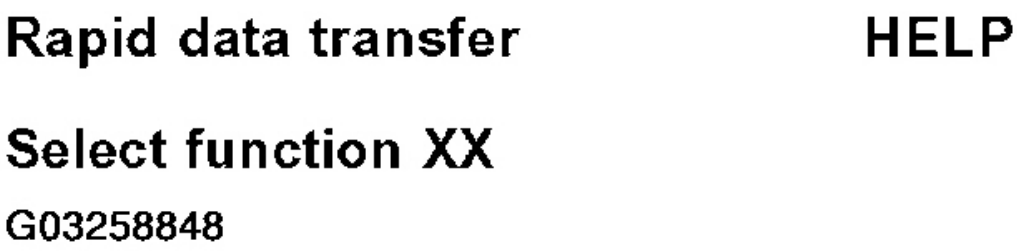


Fig. 28: Checking Components Of Electronic Engine Power Control System
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ELECTRONIC ENGINE POWER CONTROL (EPC) WARNING LAMP IN INSTRUMENT CLUSTER, SIGNIFICANCE

"EPC" is the abbreviation for Electronic Engine Power Control.

When the ignition is switched on the Engine Control Module checks all components which are important for the correct functioning of the electronic engine power control.

If malfunctions are recognized in electronic power control system when the engine is running, the Engine Control Module will switch on the EPC lamp (these malfunctions are marked in the DTC table). Simultaneously an entry is made in the Engine Control Module DTC memory.

Location of EPC warning lamp

Fig. 29: Locating Electronic Engine Power Control Warning Lamp
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking function of warning lamp

See Electronic Power Control (EPC) Warning Lamp, Checking (Through MY 1999) or Electronic Power Control (EPC) Warning Lamp, Checking (From MY 2000) in ENGINE PERFORMANCE.

THROTTLE POSITION (TP) SENSORS -G79- AND -G185-, CHECKING

Special tools and equipment

- VAG 1526 Hand multimeter
- VAG 1551 Scan Tool (or VAG 1552 vehicle system tester with VAG 1551/3 cable)
- VAG 1594 A Adapter set
- VAG 1598/22 Test box
- Wiring diagram

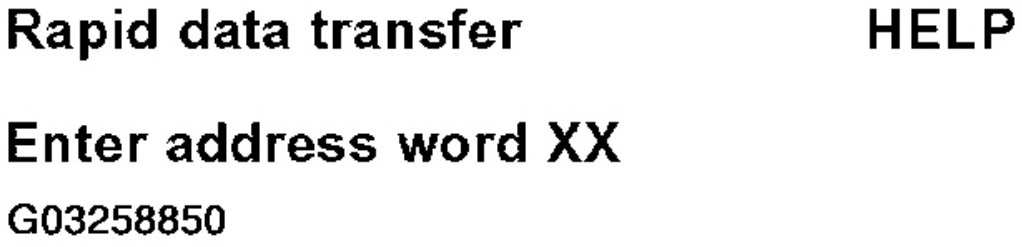


Fig. 30: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Function

Both the Throttle Position (TP) sensors -G185-and -G79- are located at the accelerator pedal and communicate the driver's intentions to the Engine Control Module (ECM) fully independently of each other. Both are located in one housing.

Test conditions

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.

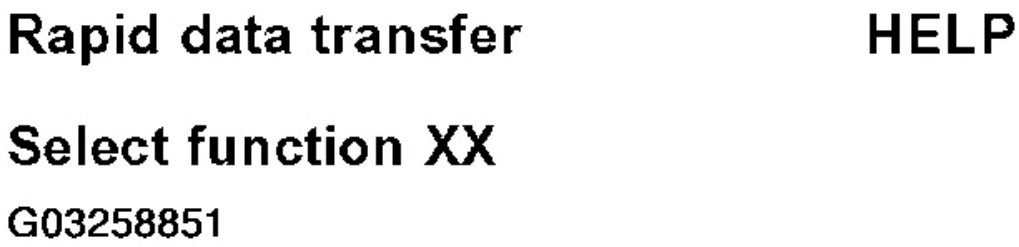


Fig. 31: Identifying Location Of Fuses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Fuse box is located behind access panel at far left end of dash.

Test sequence

- Connect VAG 1551 Scan Tool (or VAG 1552 Scan Tool) and with ignition switched on select engine electronics with "Address word" 01:

See V.A.G 1551 Scan Tool, Connecting And Selecting Engine Control Module .

Indicated on display

- Press buttons -0- and -8- for function "Read Measured Value Block" and confirm entry with -Q- button.

Indicated on display

- Press buttons -0-, -6- and -2- for "Display group number 62" and confirm entry with -Q- button.

Indicated on display: (1...4 = Display zones)

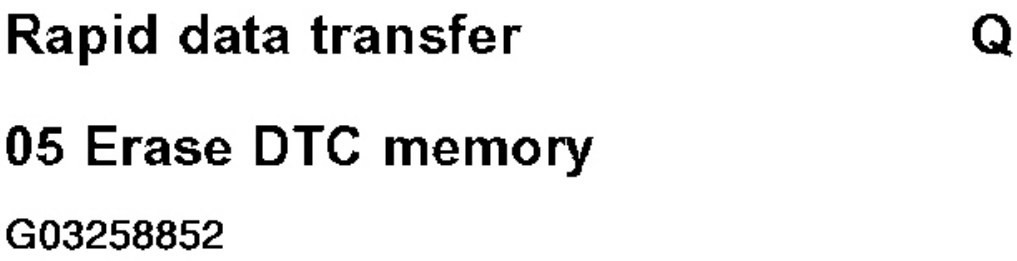


Fig. 32: V.A.G 1551 Scan Tool Display - Checking Throttle Position Sensor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check specification of TP sensor -G79- at idling stop in display zone 3.

  Specification: 6 to 96%

- Check specification of Throttle Position (TP) sensor -G185- at idling stop in display zone 4.

  Specification: 3 to 48%

NOTE: The Engine Control Module (ECM) calculates the voltage value of the angle sensor in percent relative to 5 volts and displays this value (5 volts supply voltage represents 100%).

- Operate accelerator pedal slowly until Wide Open Throttle and observe the angle indication in display fields 3 and 4:

  The percent indication in display field 3 must rise evenly. Specified range of 6 to 96% will not be used in it's entirety.

  The percent figures in display zone 4 must rise evenly. The tolerance range of 3 to 48% is not covered completely.

  NOTE: The indicated value in display field 3 must always be approximately twice as large as the value in display field 4.

- Press --> button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch ignition off.

If the display does not indicate as described:

- Check voltage supply and wiring connections of Throttle Position (TP) sensor -G185- and -G79-. See **CHECKING VOLTAGE SUPPLY AND WIRING TO CONTROL MODULE** .

Checking voltage supply and wiring to control module

- Remove driver side storage compartment

  See **GLOVE BOX, REMOVING AND INSTALLING**

- Disconnect 6-pin connector for Throttle Position (TP) sensors -G79- and -G185-.
- Switch ignition on.
- Connect multimeter for voltage measurement at following terminals of connector using adapter cables from VAG 1594 A.

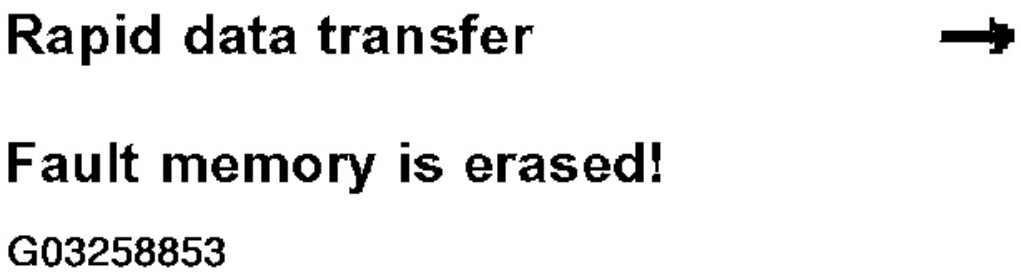


Fig. 33: Connecting Multimeter For Voltage Measurement Terminals Of Connector Using Adapter Cables From VAG 1594 A
Courtesy of VOLKSWAGEN OF AMERICA, INC.

  - Contact 1 + Ground (GND)
  - Terminal 1 + 5
  - Terminal 2 + Ground (GND)
  - Terminal 2 + 3
  - Specified value at least 4.5 V
- Switch ignition off.

If the specifications are not obtained:

- Remove inner plenum chamber cover, left:

  See **PLENUM CHAMBER INNER COVER, REMOVING AND INSTALLING**

- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module is not connected by this action.

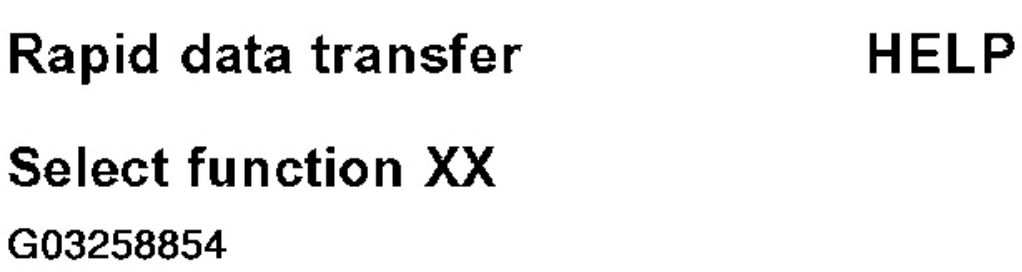


Fig. 34: Connecting Test Box VAG 1598/31 To Control Module Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring between test box and connector for open circuit according to wiring diagram.

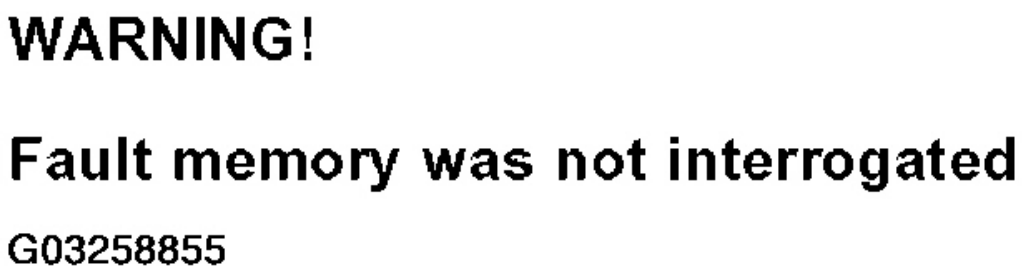


Fig. 35: Identifying Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Contact 1 + socket 72
- Contact 2 + socket 73
- Contact 3 + socket 36
- Contact 4 + socket 35
- Contact 6 + socket 34

Vehicles with automatic transmission:

- Contact 5 + socket 33
- Wire resistance: max. 1.5 ohms

- Additionally check wiring for short to battery positive or Ground.
- Additionally check wires for short to one another.

If no wiring malfunction is detected:

- Replace Throttle Position (TP) sensors -G79- and -G185-. See **ELECTRONIC ENGINE POWER CONTROL (EPC) WARNING LAMP IN INSTRUMENT CLUSTER, SIGNIFICANCE** , item 4.

Vehicles with automatic transmission 01M

- Adapt control module for automatic transmission:

See **BASIC SETTING, INITIATING** .

Continued for all vehicles

- Check DTC memory:

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

- Read readiness code:

See Readiness Code, Displaying .

If the DTC memory has been erased or the engine control module separated from the permanent positive, the readiness code must be generated again.

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing .

EVAPORATIVE EMISSION (EVAP) SYSTEM

FUNCTIONAL DESCRIPTION OF LEAK DETECTION

Depending upon the air pressure and ambient temperature, fuel vapor will form above the level of fuel in the tank.

The Evaporative Emission (EVAP) system prevents these HC emission escaping to the atmosphere.

In limited quantities, fuel vapors pass through a gravity valve (which closes at an angle of 45°) located at the highest point in the tank and through a pressure retention valve into the activated charcoal filter in the EVAP canister.

The activated charcoal stores these vapors like a sponge.

When the oxygen sensor control is active when driving (engine warm), the EVAP canister purge regulator valve -N80- is activated (pulsed) from the Engine Control Module depending upon load and engine speed. The opening period is dependent on the input signals.

Intake manifold vacuum draws fresh air through the vent opening on the underside of the EVAP canister during the purging procedure (regenerating the activated charcoal). The fuel vapors stored in the activated charcoal and fresh air are pulse-fed for combustion.

The pressure retention valve prevents fuel vapors from being drawn from the tank when the solenoid valve is open and intake manifold vacuum is present. It therefore ensures that the evacuation of the EVAP canister has priority.

No voltage (e.g. wiring open circuit) the solenoid valve is closed and the EVAP canister will not be purged.

The vacuum line from the throttle valve control part to the EVAP canister has an additional by-pass which is connected with the crankcase breather valve. The non-return valve integrated in the crankcase breather valve prevents the intake air gassing into the crankcase during some partial load ranges. This improves the overall crankcase breathing. The by-pass guarantees the crankcase breathing.

Functional description of leak detection

The Evaporative Emission (EVAP) system (including fuel tank) is equipped with a leak detection which will detect whether the system is leaking.

The diagnosis operates by pressurizing the system and should detect leaks where the damage exceeds 1 mm in diameter.

During the diagnosis the Leak detection pump -V144- builds up a pressure of approx. 30 mbar in the Evaporative Emission (EVAP) system. The pump will switch off when the pressure is attained. When the pressure falls to below a certain figure, the pump will switch on again. The On Board Diagnostic monitors the time between the switched on periods, and if it is too short it will register a malfunction in the DTC memory.

NOTE:

- **Hose connections are secured with either spring-type or clamp-type clips.**
- **Always replace clamp-type clips with screw-type clips.**
- **Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.**

- Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON FUEL SUPPLY SYSTEM** .
- Observe rules for cleanliness. See **RULES OF CLEANLINESS** .

Overview of EVAP canister system. See **EVAPORATIVE EMISSION (EVAP) SYSTEM, OVERVIEW** .

EVAPORATIVE EMISSION (EVAP) SYSTEM COMPONENTS, SERVICING

NOTE: The following list refers to items in Fig. 36 .

1. **Leak detection pump (LDP) -V144- */****
   - at EVAP canister
   - In right rear wheel well
   - Checking. See **LEAK DETECTION PUMP (LDP) -V144-, CHECKING**
2. **Connector**
   - 3 pin
3. **Vacuum pipe**
   - To throttle valve control module. See **EVAP CANISTER PURGE REGULATOR VALVE -N80-, CHECKING** , Pos. 15
   - Press together at front to release
4. **Vent pipe**
   - From changeover valve on fuel tank. See **CHECKING FUEL PUMP NON-RETURN VALVE** , item 10
5. **To Evaporative Emissions (EVAP) Canister Purge Regulator Valve -N80-**
   - In engine compartment, right at side piece. See **EVAP CANISTER PURGE REGULATOR VALVE -N80-, CHECKING** , Pos. 17
6. **EVAP canister**
   - In rear right wheel well behind wheel housing liner
7. **10 N.m**
8. **3 N.m**
9. **Air cleaner for leak detection pump**
10. **Connecting hose**
    - Suction side
11. **Connecting hose**
    - Pressure side

Rapid data transfer **Q**

06 End output

G03258856

Fig. 36: Identifying Evaporative Emission System Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- **Components marked with an * are checked by the On Board Diagnostic (OBD). See Fig. 36 .**

  See On Board Diagnostic (OBD) .

- **Components marked with ** are checked by the Output Diagnostic Test Mode (DTM).**

  See Output Diagnostic Test Mode (DTM), Initiating .

EVAPORATIVE EMISSION (EVAP) SYSTEM, OVERVIEW

NOTE: The following list refers to items in Fig. 37 .

1. **Vacuum reservoir**
2. **Pressure retaining valve**
   - For fuel tank breathing
   - Checking. See **Checking Pressure Retaining Valve**
3. **Change-over valve**
   - Checking. See **Checking Change-Over Valve**
4. **EVAP canister**
   - In rear right wheel well behind wheel housing liner
5. **Leak detection pump (LDP) -V144-**
   - At EVAP canister
   - Checking activation:

     See Output Diagnostic Test Mode (DTM), Initiating

   - Checking. See **LEAK DETECTION PUMP (LDP) -V144-, CHECKING**
6. **Air cleaner for leak detection pump**
7. **Tank cap unit**
   - With rubber cup
8. **Fuel tank**
   - Support with engine and transmission jack VAG 1383 A when removing
   - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
9. **Fuel delivery unit**
   - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
10. **Check-valve**

- Installation position: arrow points in direction of flow

11. **Intake pipe before turbocharger**
12. **Fuel pressure regulator**
13. **Fuel rail with injectors**
14. **Intake manifold upper part**
15. **Throttle valve control module -J338-**
16. **Fuel filter**
    - Installation position: Arrow points in throughflow direction
17. **EVAP canister purge regulator valve -N80- */****
    - In engine compartment at right about wheel housing
    - Checking activation:

      See Output Diagnostic Test Mode (DTM), Initiating

    - Checking function. See **EVAP CANISTER PURGE REGULATOR VALVE -N80-, CHECKING**
18. **Test connection**
19. **Gravity/overflow valve**

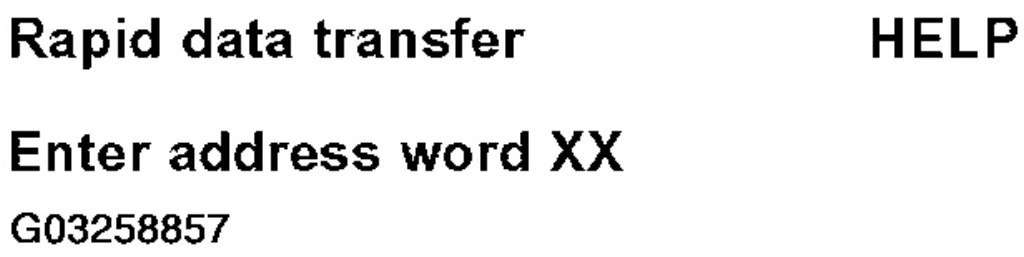


Fig. 37: Overview Of Evaporative Emission System
Courtesy of VOLKSWAGEN OF AMERICA, INC.

EVAP CANISTER PURGE REGULATOR VALVE -N80-, CHECKING

In a no-current situation the valve is closed.

Checking activation, Output Diagnostic Test Mode (DTM):

See Output Diagnostic Test Mode (DTM), Initiating

Special tools and equipment

- VAG 1551 Scan Tool

NOTE: The VAG 1552 vehicle system tester can be used instead of the VAG 1551 Scan Tool, however a print-out is not possible.

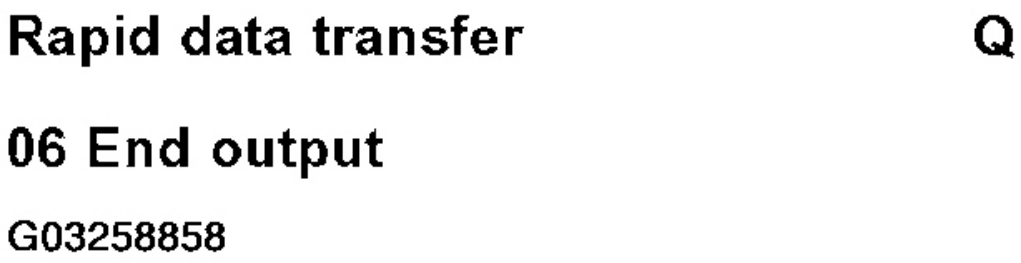


Fig. 38: Identifying VAG 1551 Scan Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1551/3 Cable

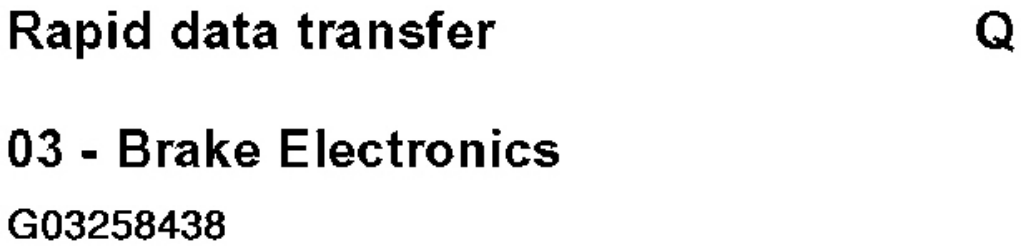


Fig. 39: Identifying VAG 1551/3 Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Test conditions

- Fuse No. 43 must be OK

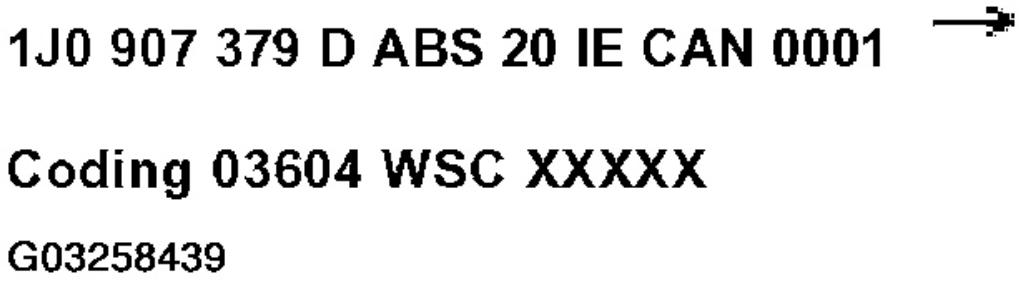


Fig. 40: Identifying Location Of Fuse No. 43
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Coolant temperature must be at least 85°C. See display group 04, display zone 3

NOTE: Fuse box is located behind access panel at far left end of dash.

Functional check

- Connect VAG 1551 Scan Tool (VAG 1552). Start engine and select Engine Control Module with "Address word" 01. Connecting scan tool and selecting Engine Control Module:

See V.A.G 1551 Scan Tool, Connecting And Selecting Engine Control Module

Indicated on display

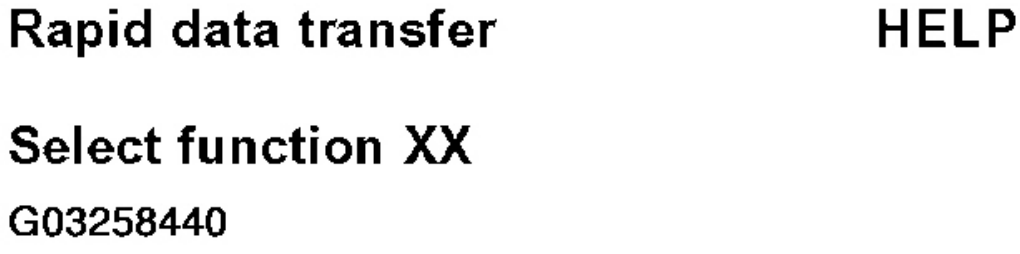


Fig. 41: V.A.G 1551 Scan Tool Display - Checking EVAP Canister Purge Regulator Valve (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -8- for "Read measured value block" function and confirm entry with -Q-button.

Indicated on display

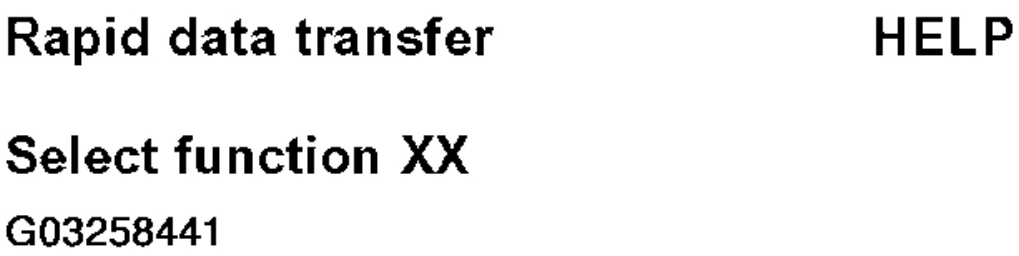


Fig. 42: V.A.G 1551 Scan Tool Display - Checking EVAP Canister Purge Regulator Valve (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -7- and -0- for "Display group number 70" and confirm entry with -Q- button.

Indicated on display: (1-4 = Display zones)

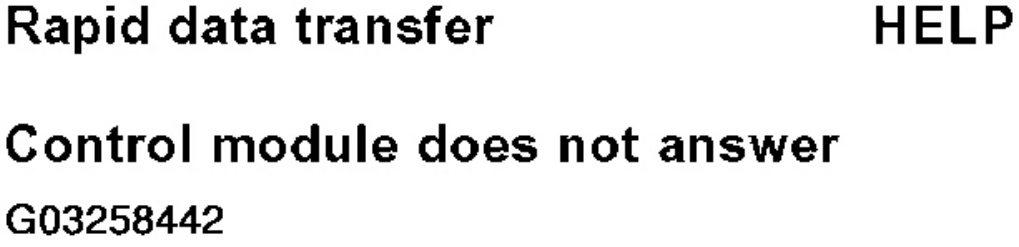


Fig. 43: V.A.G 1551 Scan Tool Display - Checking EVAP Canister Purge Regulator Valve (3 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press button -4- for "Basic setting" function ("Tank venting valve diagnosis" will be initiated)

NOTE: The engine must not be loaded during this diagnosis because the diagnosis will be interrupted and will not be started again until the engine is revved-up.

Indicated on display: (1-4 = Display zones)

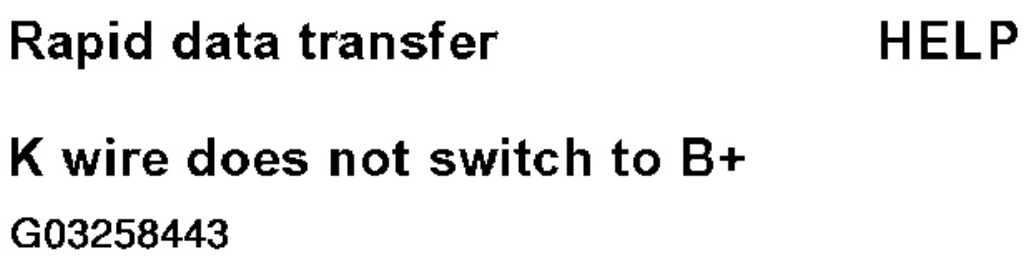


Fig. 44: V.A.G 1551 Scan Tool Display - Checking EVAP Canister Purge Regulator Valve (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

When the diagnosis is initiated by the Engine Control Module, the display in display zone 4 jumps from "Test OFF" to "Test ON".

- Run engine at idling speed until specification "EVAP OK" is displayed in display zone 4.

NOTE: If the display jumps from "Test ON" to "Test OFF" during the test, rev up briefly and the test will be repeated.

DISPLAY JUMPS FROM "TEST ON" TO "TEST OFF"

-	Display zones			
	1	2	3	4
Display group 70: Evaporative Emission (EVAP) system diagnosis (tank venting system)				
Display	xxx. x %	xxx. x %	xxx %	Test OFF/Test ON EVAP(1) OK EVAP n.OK
Indicated	EVAP canister purge regulator valve opening during diagnosis	oxygen sensor control, Bank 1	EVAP canister purge regulator valve condition	Diagnosis condition and Diagnosis result
Working range	0.0-100.0%	-100.0-100.0%	0-199%	-
Specified value	-	-	-	EVAP OK.
(1) TEV means EVAP canister purge regulator valve.				

If "EVAP not OK" appears in display zone 4:

- Initiate output diagnostic test mode and activate EVAP Canister Purge Regulator Valve -N80-:

  See Output Diagnostic Test Mode (DTM), Initiating

- Check DTC memory.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- Read readiness code.

  See Readiness Code, Displaying

  If DTC memory has been erased or Engine Control Module separated from permanent (battery) positive, readiness code must be generated again.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

  If the specification "EVAP OK" is obtained:

- Press --> button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch ignition off.

EVAPORATIVE EMISSION (EVAP) SYSTEM, CHECKING FOR LEAKS

Special tools and equipment

- VAG 1551 Scan Tool

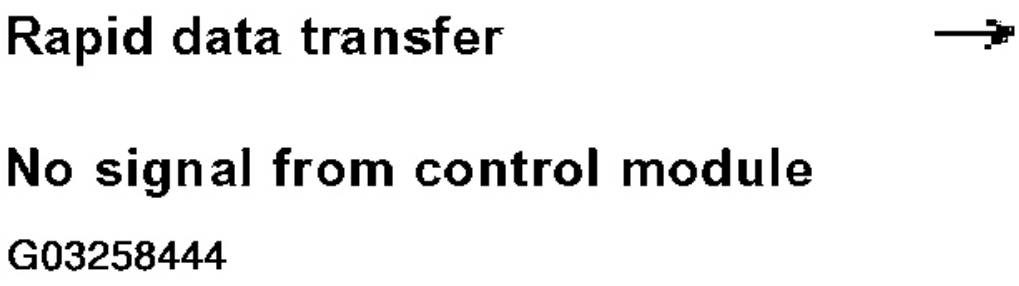


Fig. 45: Identifying VAG 1551 Scan Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The VAG 1552 vehicle system tester can be used instead of the VAG 1551 Scan Tool, however a print-out is not possible.

- VAG 1551/3 Cable

Fig. 46: Identifying VAG 1551/3 Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Test conditions

NOTE: Fuse box is located behind access panel at far left end of dash.

- Fuse No. 43 must be OK

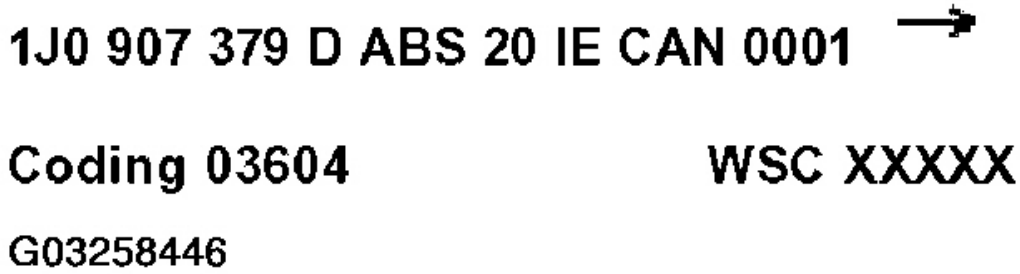


Fig. 47: Identifying Location Of Fuse No. 43
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- No malfunction stored in DTC memory

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- All electrical consumers, e.g. lights and rear window defroster must be switched off
- If the vehicle is equipped with an air conditioner, this must be switched off
- Throttle valve angle less than 4.1%. See display group 03, display zone 3
- Coolant temperature less than 95° C. See display group 04, display zone 3
- Intake air temperature less than 90° C. See display group 04, display zone 4

Functional check

- Connect VAG 1551 Scan Tool (or VAG 1552 Scan Tool). Start engine and select Engine Control Module with "Address word" 01.

  Connecting scan tool and selecting Engine Control Module:

  See V.A.G 1551 Scan Tool, Connecting And Selecting Engine Control Module

  Indicated on display

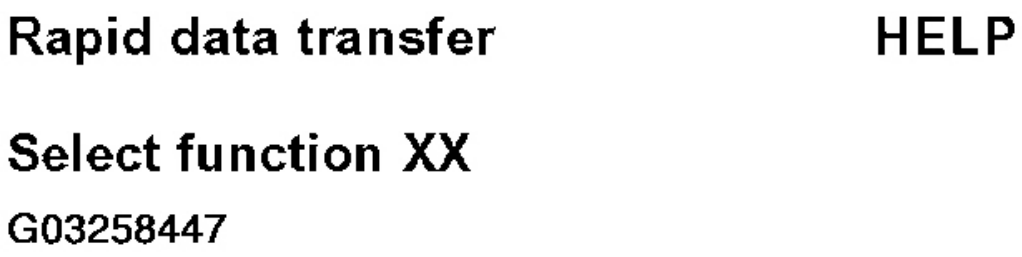


Fig. 48: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -8- for function "Read Measuring Value Block" and confirm entry with -Q- button.

Indicated on display

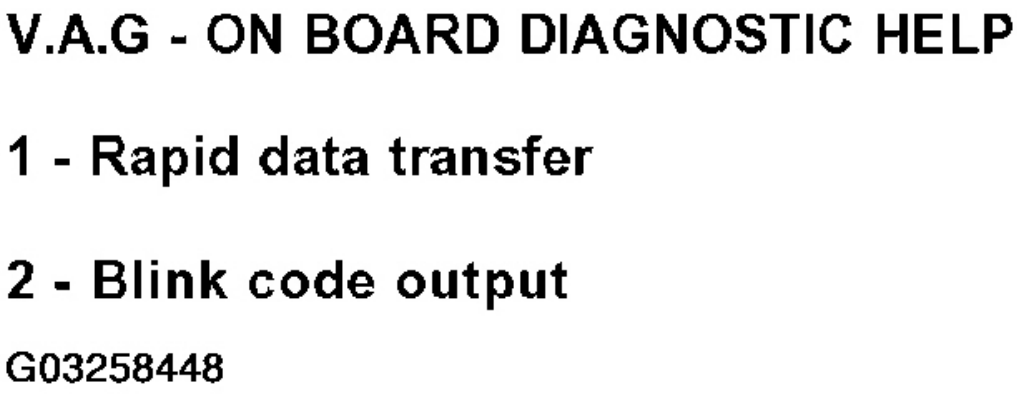


Fig. 49: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -7- and -1- for "Display group number 71" and confirm entry with -Q- button.

  Indicated on display

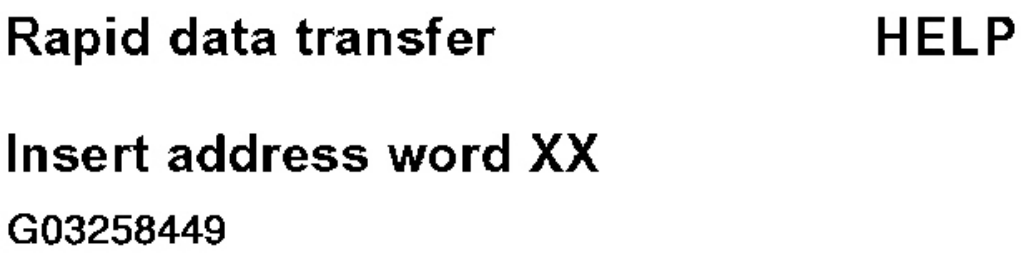


Fig. 50: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (3 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Indicated on display

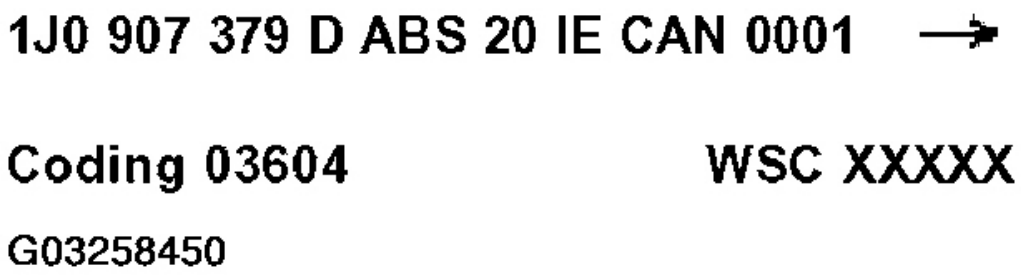


Fig. 51: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check display in display zone 1:

DISPLAY IN DISPLAY ZONE CHECK

-	Display zones			
	1	2	3	4
Display group 71: Evaporative Emission (EVAP) system diagnosis (leak detection)				
Display	Reed open Reed closed	Small leak/large leak Abort	Syst. Test Check Check end	Test OFF/Test ON Syst. OK Syst. not OK
Indicated	Reed contact condition	Malfunction message	System condition	Diagnosis condition and diagnosis result
Working range	-	-	-	-
Specified value	Reed open	-	Check.END	Syst. OK

If "Reed open" appears in display group 1:

- Open fuel tank cap briefly to allow pressure in fuel tank to dissipate, this will close reed contact.

If the specification is obtained:

- Press button 4 for "Introduction of basic setting" function.

Indicated on display

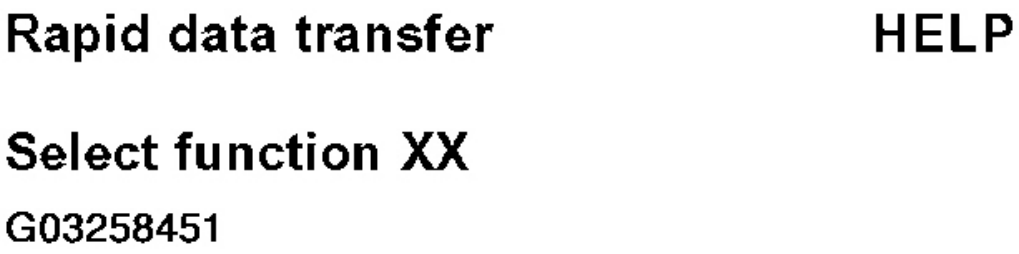


Fig. 52: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (5 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The test of the Evaporative Emission (EVAP) system will be initiated. First of all the function of the Reed contact (in the Leak detection pump -V144-) will be checked by the control module.

After approx. 10 seconds the Leak Detection Pump (LDP) -V144- will be activated and build-up pressure in the fuel system.

Indicated on display

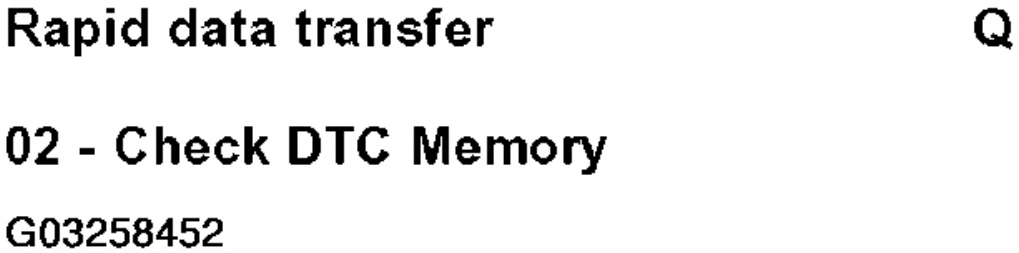


Fig. 53: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (6 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The test will be initiated after approx. 50 seconds (when there is sufficient pressure available in the fuel system can last up to 120 seconds).

Indicated on display

Fig. 54: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (7 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The Leak detection pump V144- switches off and the control module measures the time until the reed contact closes.

Indicated on display

Fig. 55: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (8 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check display in display zones 3 and 4: specified value display field 3: Check. END Specified value display field 4: Syst. OK

DISPLAY IN DISPLAY ZONE CHECK

-	**Display zones**			
	1	2	3	4
Display group 71: Diagnosis of Evaporative Emission (EVAP) system (leak detection)				
Display	Reed closed Reed open	Small leak/large leak Abort	Syst. Test Check Check end	Test OFF/Test ON Syst. OK Syst. not OK
Indicated	Condition Reed contact	Malfunction message	System condition	Result
Working range	-	-	-	-
Specified	Reed open	-	**Messg. END**	**Syst. OK**

value	If a malfunction message is indicated: See **CHECKING FOR LEAKS** checking for leaks	If the specifications are not obtained: Check DTC memory, See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

If the specifications are obtained:

- Press --> button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch ignition off.

If the specifications are not attained:

- Press buttons -0- and -8- for "Read Measuring Value Block" function and confirm entry with Q button.

Indicated on display

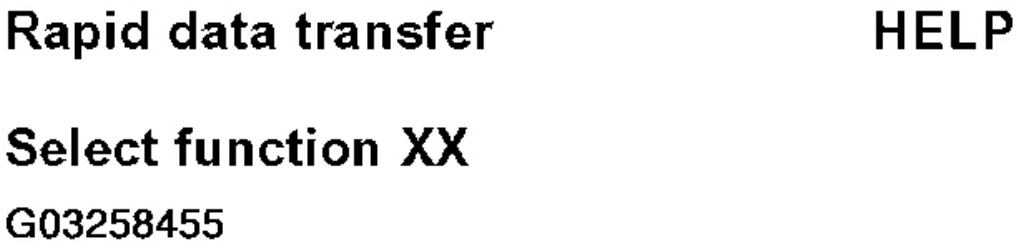
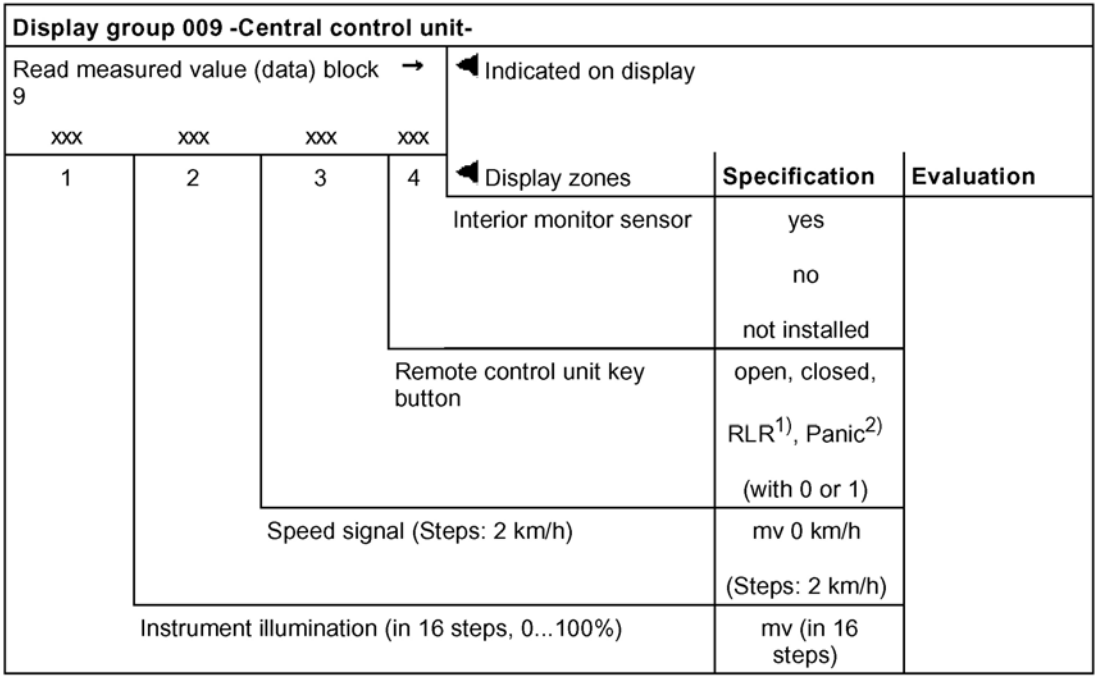


Fig. 56: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (9 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -7- and -0- for "Display group number 70" and confirm entry with -Q- button.

Indicated on display: (1-4 = Display zones)



Display group 009 -Central control unit-						
Read measured value (data) block → 9				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	**Specification**	**Evaluation**
				Interior monitor sensor	yes no not installed	
				Remote control unit key button	open, closed, RLR[1], Panic[2] (with 0 or 1)	
				Speed signal (Steps: 2 km/h)	mv 0 km/h (Steps: 2 km/h)	
				Instrument illumination (in 16 steps, 0...100%)	mv (in 16 steps)	

[1] RLR= Rear Lid Remote Release

[2] Only vehicles for USA, alarm system and turn signal lights are activated

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Fig. 57: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (10 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press button -4- for "Basic setting" function ("Tank venting valve diagnosis" will be initiated).

NOTE: The engine must not be loaded during this diagnosis because the diagnosis will be interrupted and will not be started again until the engine is revved-up.

Indicated on display: (1-4 = Display zones)

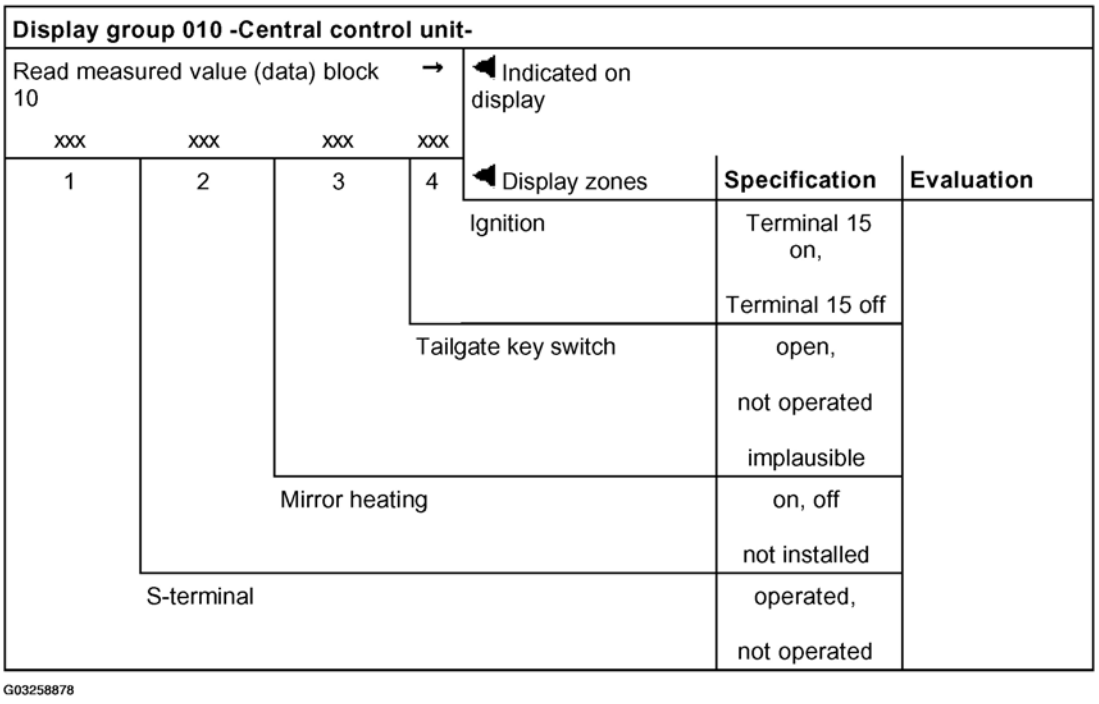

Fig. 58: V.A.G 1551 Scan Tool Display - Checking EVAP System For Leak (11 Of 11)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

When the diagnosis is initiated by the Engine Control Module, the display in display zone 4 jumps from "Test OFF" to "Test ON."

- Run engine at idling speed until specification "EVAP OK" is displayed in display zone 4.

NOTE: If the display jumps from "Test ON" to "Test OFF" during the test, rev up briefly and the test will be repeated.

DISPLAY IN DISPLAY ZONE CHECK

-	Display zones			
	1	2	3	4
Display group 70: Evaporative Emission (EVAP) system diagnosis (tank venting system)				
Display	xxx.x %	xxx.x %	xxx %	Test OFF/Test ON EVAP(1) OK EVAP not OK
Indicated	Opening of EVAP canister purge regulator valve during diagnostic	oxygen sensor control value Bank 1	Condition of EVAP canister purge regulator valve (relative EVAP - specification)	Diagnostic condition and Diagnostic result
Working	0.0-100.0%	-100.0-100.0%	0-199%	-

range				
Specified value	-	-	-	EVAP OK.
(1) TEV means EVAP canister purge regulator valve				

If "EVAP n. OK" appears in display zone 4:

- Initiate output diagnostic test mode and activate EVAP Canister Purge Regulator Valve -N80-:

  See Output Diagnostic Test Mode (DTM), Initiating

- Read readiness code.

See Readiness Code, Displaying

If DTC memory has been erased or Engine Control Module separated from permanent (battery) positive, readiness code must be generated again.

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

If the specification "EVAP OK" is obtained:

- Press --> button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch ignition off.

Checking for leaks

If a small or large leak is detected during the check of the Evaporative Emission (EVAP) system, proceed as follows.

- Switch ignition off.
- Check whether sealing cap of fuel tank is completely closed or whether sealing ring is leaking, replace if necessary.
- Repeat functional check.

Is the malfunction still present:

- Fold rear seat bench forward.
- Remove cover under seat bench.
- Check whether locking ring for fuel delivery unit is tight. It can be found under luggage compartment floor trim. Replace seal if it is malfunctioning.
- Tighten locking ring with special tool 3217.

- Check supply and return pipes on fuel delivery unit for leaks.
- Repeat functional check.

Is the malfunction still present:

- Remove rear right wheel housing liner.

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW** .

- Check connecting pipes and hoses between Leak Detection Pump and EVAP canister. Replace if necessary. See **EVAPORATIVE EMISSION (EVAP) SYSTEM COMPONENTS, SERVICING** .
- Check wires and wire connections between EVAP canister and tank flap unit or tank ventilation valve for proper seal. See **EVAPORATIVE EMISSION (EVAP) SYSTEM, OVERVIEW** .
- Repeat functional check.

Is the malfunction still present:

- Remove EVAP canister and check for cracks and leaks, replace if necessary.
- Repeat functional check.

LEAK DETECTION PUMP (LDP) -V144-, CHECKING

Special tools and equipment

- VAG 1715 Multimeter
- VAG 1527 BLED test light
- VAG 1594 A Adapter set
- VAG 1598/22 Test box
- Wiring diagram

Display group 011 -Central control unit-						
Read measured value (data) block 11 →				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	**Specification**	**Evaluation**
				Empty[1)]		
				Sliding/tilting sunroof released[2)]	yes, no	
				Trunk lid/tailgate contact switch	open, closed	
				Hood contact switch	operated, not operated, not installed	

[1)] Empty means in this case: Display zone is blank

[2)] The central control unit transmits a switch-off delayed terminal 15 to the sliding roof control unit. The sliding/tilting roof can then still be operated from the point when the ignition is switched off until one of the front doors is opened.

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Fig. 59: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking voltage supply

Test conditions

- Fuse No. 43 must be OK

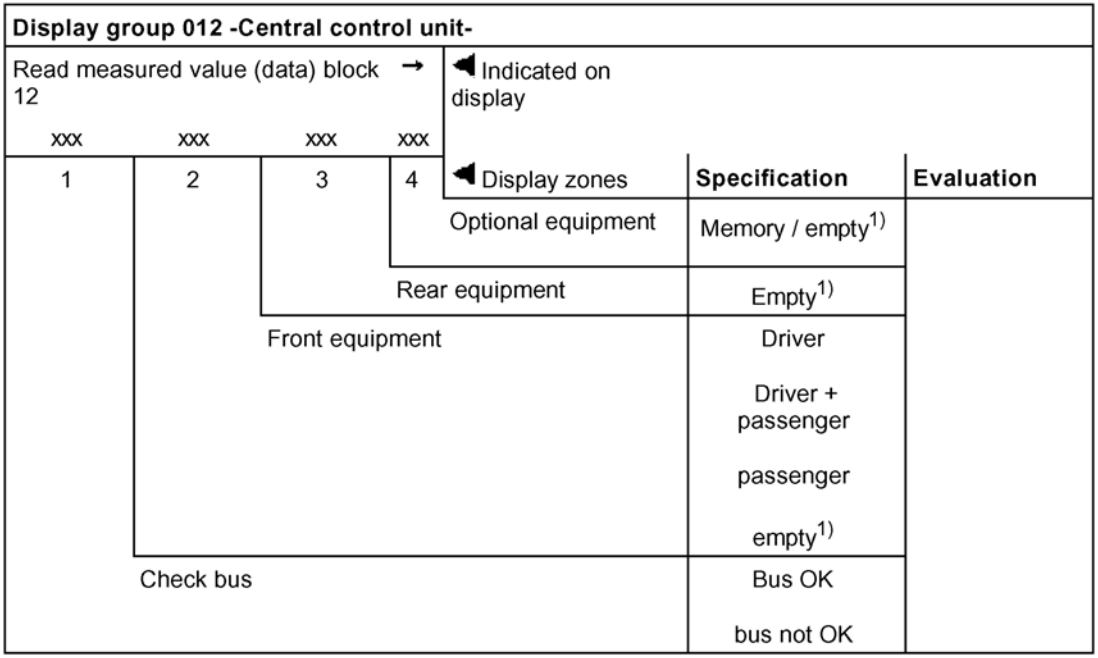


Fig. 60: Identifying Location Of Fuse No. 43
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- The battery voltage must be at least 11.5 V

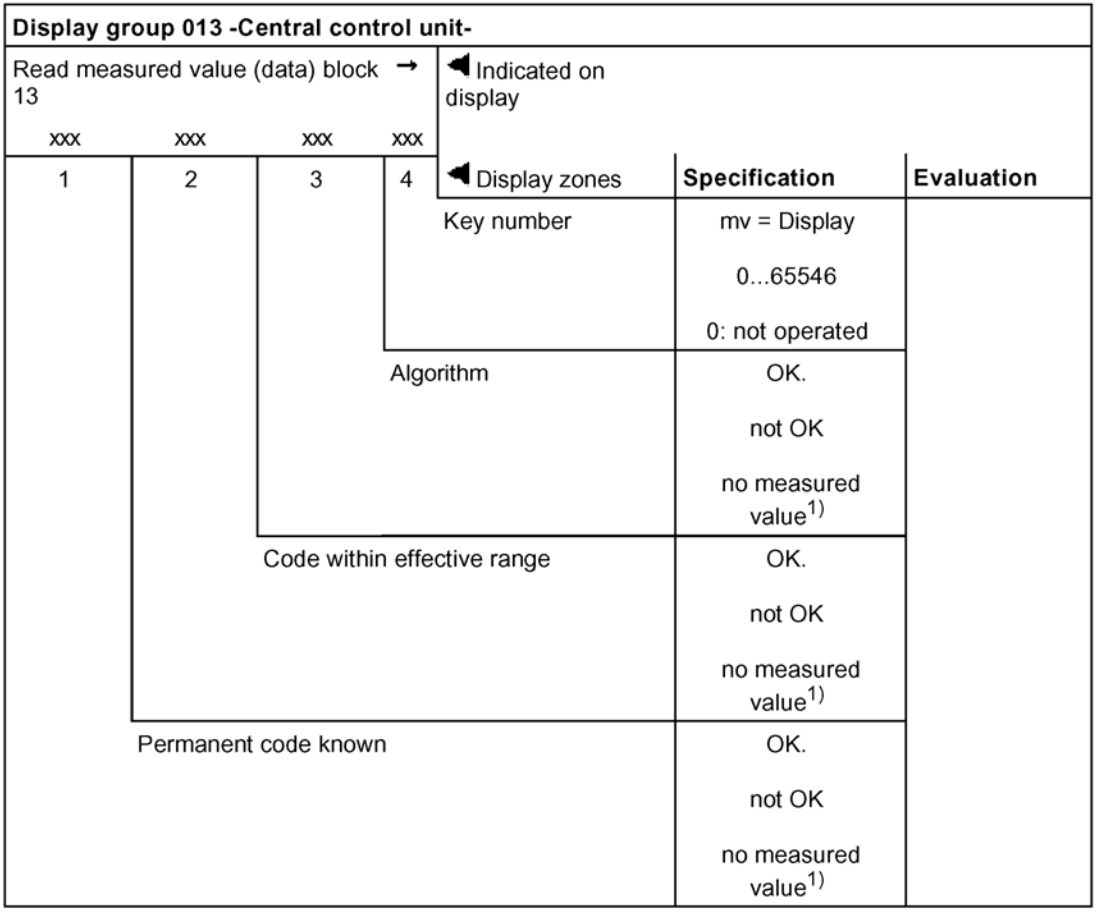
NOTE: Fuse box is located behind access panel at far left end of dash.

Test sequence

- Remove rear right wheel well liner.

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW**

- Disconnect 3 pin connector from Leak Detection Pump -V144-.



Display group 013 -Central control unit-						
Read measured value (data) block → 13				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	**Specification**	**Evaluation**
				Key number	mv = Display 0...65546 0: not operated	
				Algorithm	OK. not OK no measured value[1)]	
				Code within effective range	OK. not OK no measured value[1)]	
				Permanent code known	OK. not OK no measured value[1)]	

[1)] If the remote control key is operated several times the third display - no measured value - will change to "OK".

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Fig. 61: Disconnecting 3 Pin Connector From Leak Detection Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect LED test light VAG 1527 between connector terminal 3 (positive) and engine Ground.

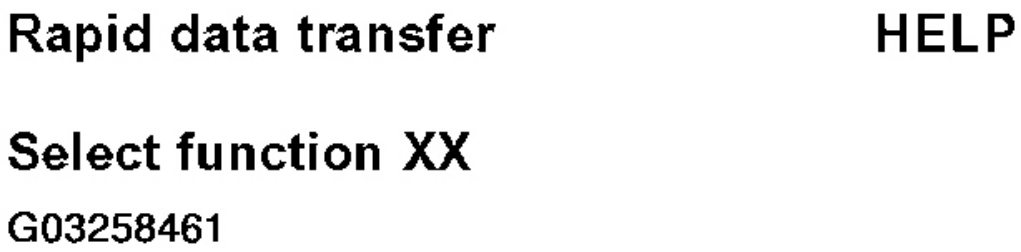

Fig. 62: Identifying Leak Detection Pump Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Start engine and run at idling speed:

  LED must light up.

- Switch ignition off.

If the LED does not light up:

- Check wire for open circuit between 3 pin connector terminal 3 and relay plate using wiring diagram.

  Wire resistance: max. 1.5 ohm

LED lights up (voltage supply OK.):

- Remove inner plenum chamber cover, left.

  See **PLENUM CHAMBER INNER COVER, REMOVING AND INSTALLING**

- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module is not connected by this action.

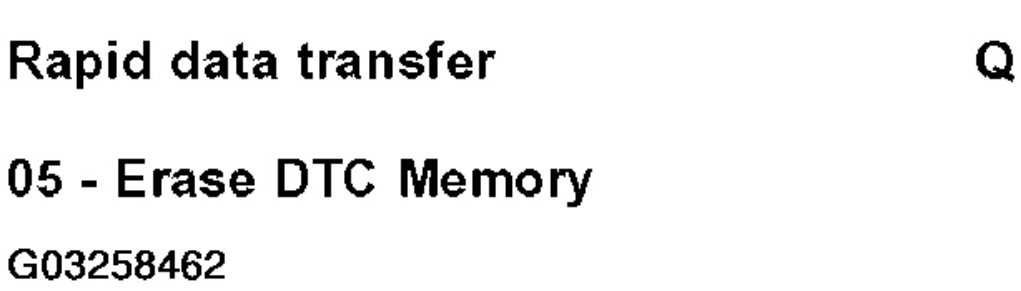

Fig. 63: Connecting Test Box VAG 1598/31 To Control Module Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring between test box and 3 pin connector for open circuit using wiring diagram.

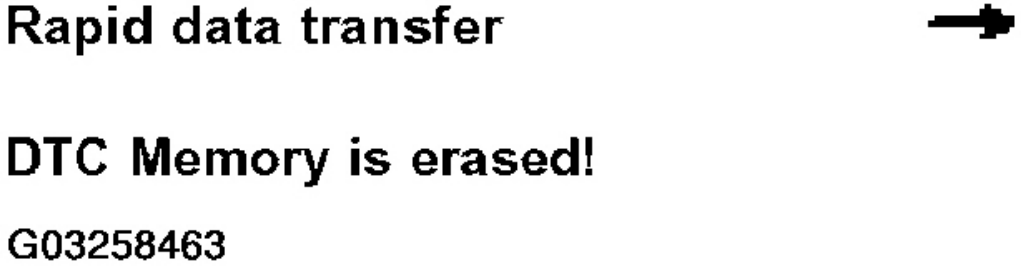

Fig. 64: Identifying Leak Detection Pump Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Contact 1 + socket 80

Contact 2 + socket 25

Wire resistance: Max. 1.5 ohm

- Additionally, check wires for short to one another.

  Specification: infinite ohm

If no wiring malfunction is detected and voltage was present between contact 3 and Ground:

- Replace Leak Detection Pump -V144.
- Check DTC memory.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- Read readiness code.

  See Readiness Code, Displaying

  If the DTC memory has been erased or the engine control module separated from permanent positive, the readiness code must be generated again.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- Check wiring between test box and 3 pin connector for open circuit using wiring diagram.

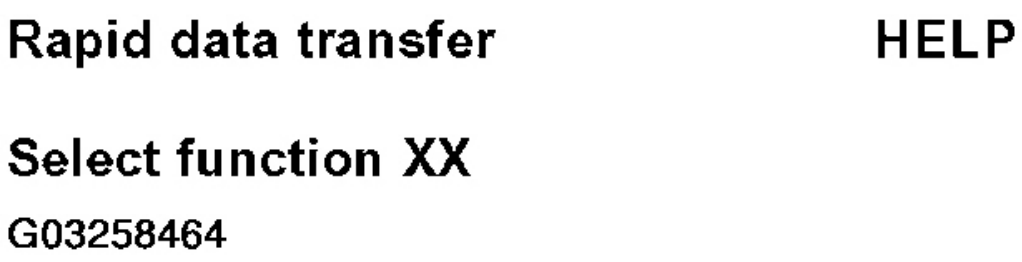

Fig. 65: Identifying Leak Detection Pump Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Contact 1 + socket 80

Contact 2 + socket 25

Wire resistance: Max. 1.5 ohm

- Additionally, check wires for short to one another.

  Specification: infinite ohm

If no wiring malfunction is detected and voltage was present between contacts 1 + 3:

- Replace Leak Detection Pump -V144-.

- Check DTC memory.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- Read readiness code.

  See Readiness Code, Displaying

  If the DTC memory has been erased or the Engine Control Module separated from permanent positive, the readiness code must be generated again.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

Checking resistance

Test sequence

- Remove rear right wheel housing liner.

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW**

- Disconnect 3-pin connector from Leak Detection Pump -V144-.

Fig. 66: Disconnecting 3-Pin Connector From Leak Detection Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect hand multimeter VAG1526 to measure resistance between contacts 1 and 3 of -V144.

  Specification: 640-720 ohm

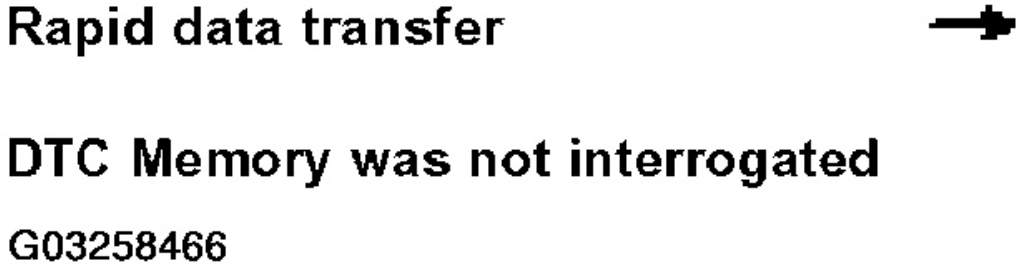

Fig. 67: Connecting Hand Multimeter Vag1526 To Measure Resistance Between Contacts 1 And 3 Of -V144
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect hand multimeter VAG1526 to measure resistance between contacts 2 and 3 of -V144 a specification of 17.5-27.5 ohm.

  Specification: 12.5 to 19.5 ohm

If the specifications are not attained:

- Replace Leak Detection Pump -V144-.
- Check DTC memory.

  See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

- Read readiness code.

See Readiness Code, Displaying

If the DTC memory has been erased or the Engine Control Module separated from permanent (battery) positive, the readiness code must be generated again.

See Diagnostic Trouble Code (DTC) Memory, Checking And Erasing

FUEL SUPPLY SYSTEM COMPONENTS, REMOVING AND INSTALLING

NOTE:

- **Hose connections are secured with either screw or spring clips.**
- **Always replace clamp type clips with screw or spring clips.**

Fuel filter, servicing. See **FUEL FILTER, SERVICING**

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

Accelerator mechanism, servicing. See **ACCELERATOR MECHANISM, SERVICING** .

FUEL TANK SYSTEM, REMOVING AND INSTALLING

NOTE: The following list refers to items in Fig. 1 .

1. **Sealing cap**
   - Secured with strap from m.y. 2000
2. **Seal**
   - Replace if damaged
3. **Bolt**
4. **Tank flap unit**
   - With rubber cup
5. **Ground connection**
6. **O-ring**
   - Replace
7. **Vent valve**
   - To remove: unclip valve out of side support
   - Before installing, remove sealing cap (item 1)
   - Checking: See **Vent valve, checking** .
8. **Vent line**
   - Make sure it is securely seated
9. **Clamping washer**
10. **Heat shield**

11. **Fuel tank cover**
12. **25 N.m (18 ft lb)**
13. **Mounting strap**
    - Note differing lengths
14. **Fuel tank**
    - Support with VAG 1383 A engine/transmission jack when removing
        - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING** .
15. **Sealing ring**
    - Replace if damaged
    - Moisten with fuel when installing
16. **Fuel gauge sensor**
    - Note installed position on fuel tank. See **Fuel gauge sensor, installed position** .
17. **Union nut**
    - Remove and install using 3217 wrench
18. **Supply line**
    - To fuel filter. See **FUEL FILTER, SERVICING** , item -2-.
    - Clipped onto fuel tank
    - Make sure it is securely seated
    - Black
    - To remove flange: press down on tabs at connection
19. **Return line**
    - From fuel filter. See **FUEL FILTER, SERVICING** , item -2-.
    - At connection -R-
    - Blue or blue markings
    - Clipped onto fuel tank
    - Make sure it is securely seated
    - To remove from flange, press down on tabs at connection
20. **Clamp**
    - Replace clamps
21. **Hose**
22. **Gravity/overflow valve**
    - To remove valve, unclip upward out of support
    - Check valve for flow valve vertical: open, valve tilted 45° : closed
23. **10 N.m (7 ft lb)**

Fig. 1: Exploded View Of Fuel Tank System
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Fuel gauge sensor, installed position

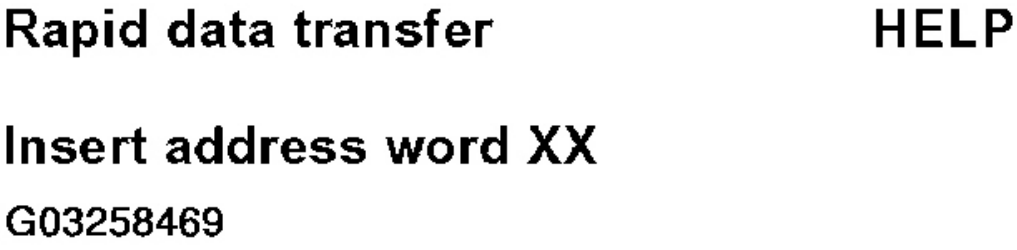

Fig. 2: Identifying Fuel Gauge Sensor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Mark on sensor must align with mark on fuel tank (arrows).

NOTE: After installing fuel gauge sensor make sure that the supply and return lines are securely clipped into the fuel tank.

Vent valve, checking

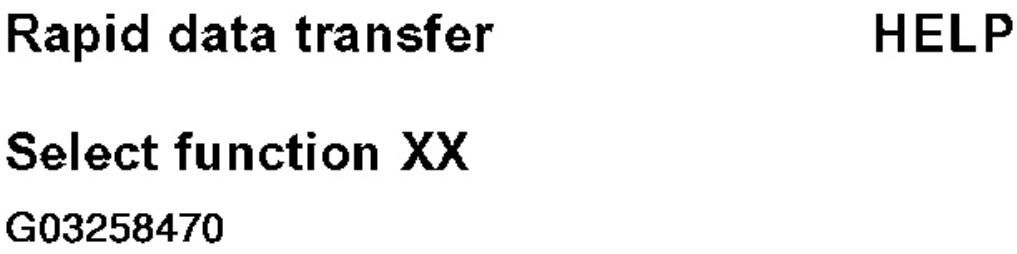

Fig. 3: Checking Vent Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Lever in rest position: Closed
- Lever pushed in direction of arrow: Open

NOTE: Remove fuel tank sealing cover before installing vent valve.

FUEL FILTER, SERVICING

NOTE: The following list refers to items in Fig. 4 .

1. **Return line**
   - From Diesel injection pump
2. **Supply line**
   - To Diesel injection pump
3. **O-ring**
   - Replace
4. **Control valve**
   - Installation position: arrow points towards fuel tank
   - When changing filter: remove mounting clip then remove control valve complete with fuel lines
   - Below + 15° C: Passageway to filter open
   - Over + 31° C: Passageway to filter closed
5. **Mounting clip**
6. **Return line**
   - To fuel tank
7. **Supply line**
   - From fuel tank

8. **Fuel filter**
    - Fill with Diesel fuel before installing
    - Flow direction is marked by an arrow
    - Do not interchange connections
    - Replace if damaged
9. **Gasket**
    - Replace if damaged
10. **Water drain plug**
    - To bleed: remove mounting clip then remove control valve complete with attached fuel lines
    - Loosen and allow approx. 100 cc's of fluid to drain

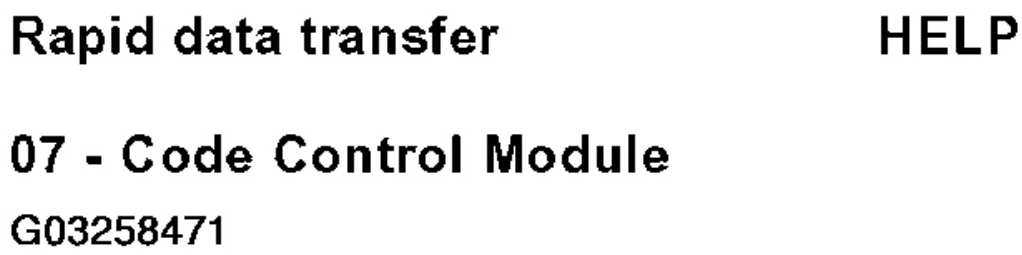

Fig. 4: Exploded View Of Fuel Filter Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM

> **WARNING: Fire hazard. Do NOT smoke or have anything in the area that can ignite Diesel fuel.**

When removing and installing the fuel gauge sensor from a full or partly filled fuel tank, observe the following:

- Before starting repairs, switch on an exhaust extraction system and place an extraction hose close to the sensor opening in the fuel tank to extract escaping Diesel fuel fumes. If no exhaust extraction system is available, a radial fan (as long as motor is not in air flow) with a displacement greater than 15 m^3 /h can be used.
- Avoid fuel contact with bare skin! Wear fuel-resistant gloves!

RULES FOR CLEANLINESS

When working on the fuel supply/injection system, pay careful attention to the following rules:

- Thoroughly clean all unions and adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- Carefully cover opened components or seal, if the repair cannot be carried out immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air if it can be avoided. Do not move vehicle unless absolutely necessary.
- Make sure that no Diesel fuel runs onto the coolant hoses. Immediately clean any accidental hose contamination. Affected hoses must be replaced immediately.

FUEL TANK, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1383 A Engine/transmission jack

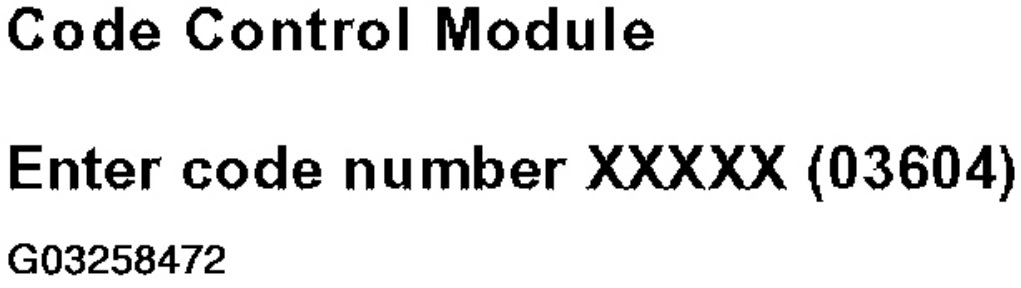

Fig. 5: Identifying VAG 1383 Engine/Transmission Jack
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1331 Torque wrench 5 to 50 N.m (3.7 to 37 ft lb)

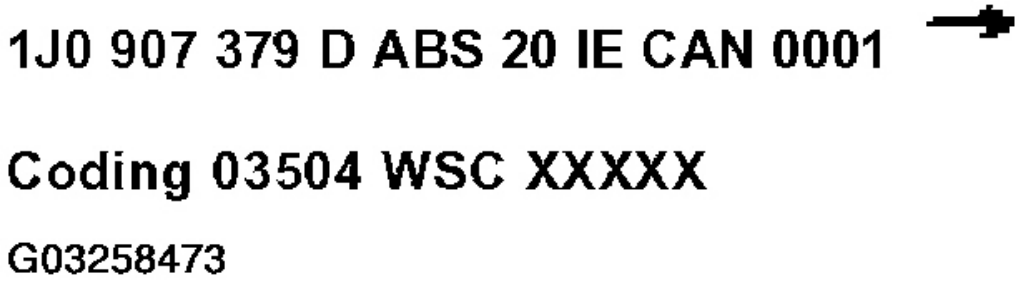

Fig. 6: Identifying VAG 1331 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Note safety precautions before starting work. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

  CAUTION: Obtain radio anti-theft code before disconnecting battery Ground strap.

- Open fuel filler.
- With ignition switched off disconnect battery Ground strap.
- Remove rear axle:

  See **FRONT AXLE SHAFT** .

- Remove right rear wheel housing liner:

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW** .

- Remove cover from fuel reservoir (arrows).

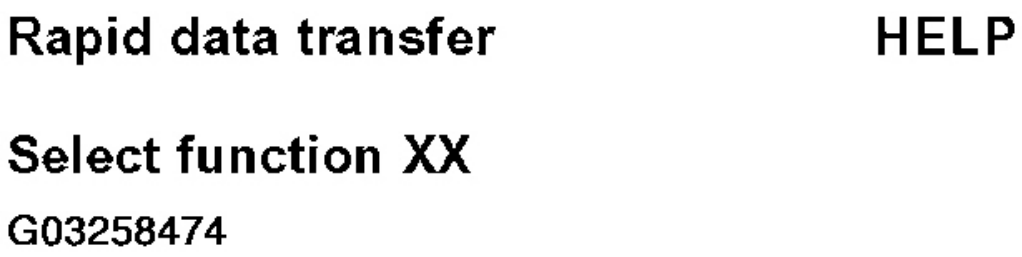

Fig. 7: Removing Cover From Fuel Reservoir
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Drain fuel tank, clean fuel filler neck and surrounding area.
- Disconnect vent lines at filler neck
- Press separated vent hose through opening in long member in fuel tank direction.
- Remove mounting bolts on filler neck.
- Fold rear bench seat forward.
- Remove fuel gauge sensor cover plate.
- Disconnect fuel supply and return lines front, right at fuel reservoir

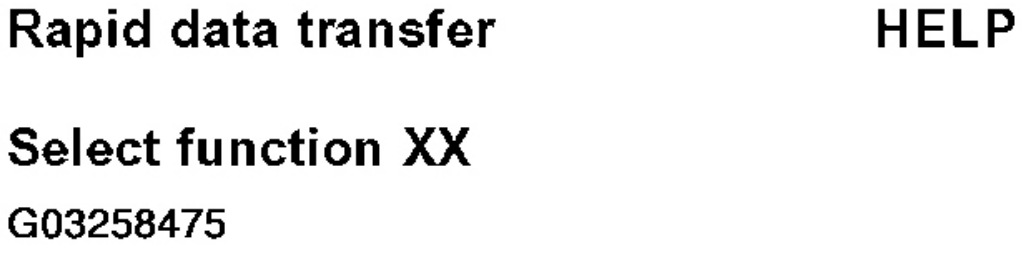

Fig. 8: Disconnecting Fuel Supply And Return Lines Front
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Press buttons on hose couplings (arrows) to do this.

- Remove tensioning strap. While removing strap, support fuel tank with VAG 1383 A engine/transmission jack.

- Lower fuel tank.

Installing

Installation is carried out in the reverse order of the removal procedure. Note the following during installation:

- Guide vent lines through opening in long member (install wiring guide)
- Secure vent lines at filler neck with clamps
- Route breather hoses kink free.
- Do not interchange supply and return hoses (return: blue or blue markings, supply: black).
- Clip supply and return lines onto fuel tank.

ACCELERATOR MECHANISM, SERVICING

NOTE: The following list refers to items in Fig. 9 .

1. **10 N.m (7 ft lb)**
2. **Throttle Position (TP) sensor -G79-**
   - Checking. See **THROTTLE POSITION SENSOR, CHECKING** .
   - Adjusting: See **THROTTLE POSITION SENSOR, ADJUSTING** .
   - Remove if instrument panel and/or pedal cluster cover require removal
3. **Cable cam**
4. **Spring washer 5-10 N.m (7 ft lb)**
5. **Threaded piece**
6. **Mounting bracket**
   - Self-locking hex nut, 20 Nm (15 ft. lb)

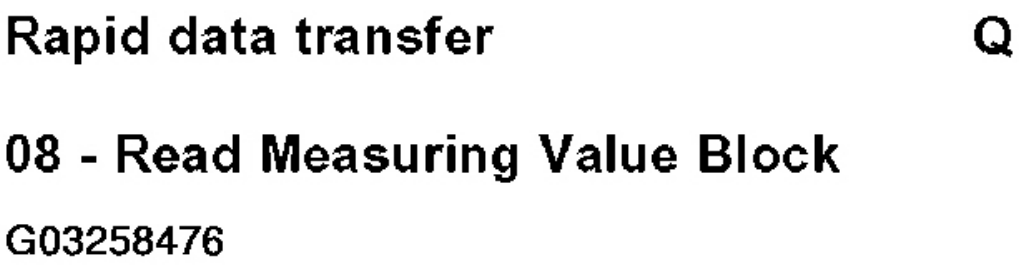

Fig. 9: Disassembled View Of Accelerator Mechanism
Courtesy of VOLKSWAGEN OF AMERICA, INC.

THROTTLE POSITION SENSOR, CHECKING

Special tools and equipment

- Fluke 83 multimeter
- VW 1594 Adaptor kit
- VAG 1598/22 Test Box
- VAG 1551/1552 Scan Tool with VAG 1551/3 adaptor cable
- Wiring diagram

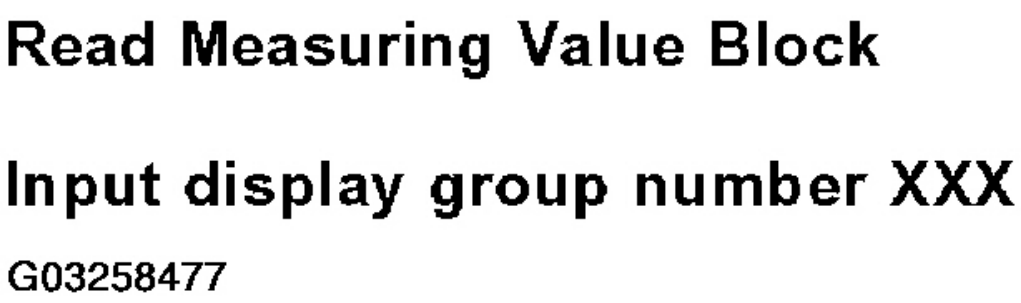

Fig. 10: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Test sequence

- Connect VAG 1551/1552 Scan Tool:

  See VAG1551/1552 Scan Tool, Connecting .

- Make sure that ignition is switched ON.
- Press 0 and 1 buttons to select Address word 01: "Engine electronics".

Display will appear as shown in **Fig. 11**

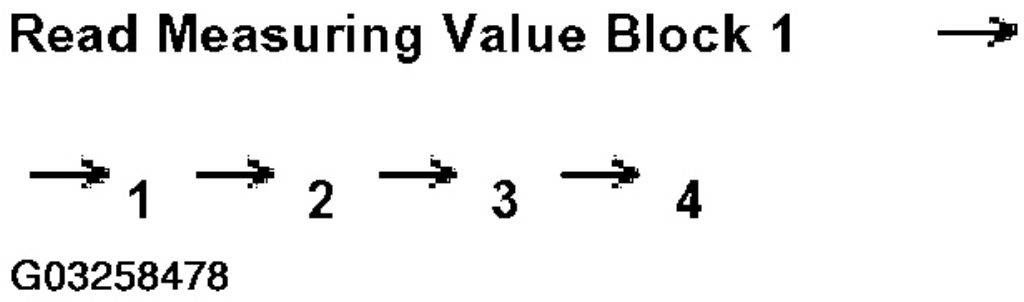

Fig. 11: Identifying VAG 1551/1552 Scan Tool Display (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press 0 and 8 buttons to select Function 08: "Read measuring value block".
- Press Q button to enter input

Display will appear as shown

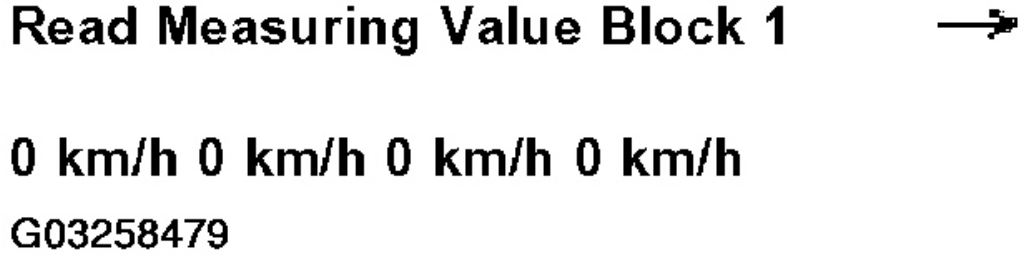

Fig. 12: Identifying VAG 1551/1552 Scan Tool Display (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press 0, 0 and 2 buttons to select "Display group 2".
- Press Q button to enter input
- Check throttle position in display zone 2. Do NOT depress accelerator pedal.

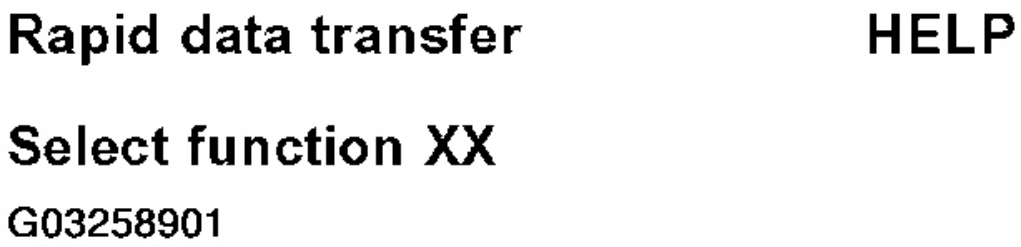

Fig. 13: Identifying VAG 1551/1552 Scan Tool Display (3 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Specification: 0.0%

- Also check Closed Throttle Position switch display in display zone 3. Center position must show a "1".

Display must appear as shown: 010

- Slowly depress accelerator pedal (until fully depressed), and observe display zones 2 and 3.

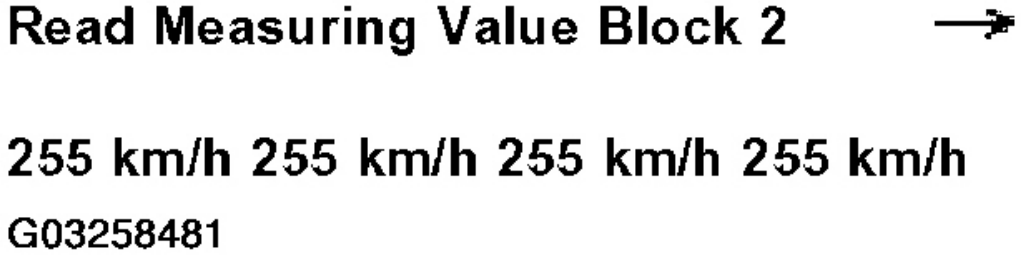

Fig. 14: Identifying VAG 1551/1552 Scan Tool Display (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Display zone 2:

Throttle Position value must increase continuously.

Specification at Wide Open Throttle position: 100%

Display zone 3:

Center digit must change to a 0

Display must appear as: 000

If End specification value not achieved:

- Press --> button.
- Press 0 and 6 buttons to select Function 06: "End transfer".
- Press Q button to enter input.
- Switch ignition off.
- Adjust Throttle Position sensor. See **THROTTLE POSITION SENSOR, ADJUSTING** .

If display does not change or is erratic:

Check Throttle Position sensor as follows:

- Press --> button.
- Press 0 and 6 buttons to select Function 06: "End transfer"
- Press Q button to enter input.
- Switch ignition off.
- Disconnect Throttle Position sensor 6-pin harness connector.
- Measure sensor resistance between connector terminals 1 + 3.

  Specification, Closed Throttle position: 0.8 to 1.4 k ohms

- Measure sensor resistance between connector terminals 2 + 3.

Adaptation

Enter channel number XX

G03258903

Fig. 15: Identifying Throttle Position Sensor 6-Pin Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Specification, Closed Throttle position: 0.8 to 1.4 k ohms

- Check Closed Throttle Position (CTP) switch -F60- in Throttle Position sensor by measuring resistance between connector terminals 4 + 6.

  Specification, Closed Throttle position: 0.8 to 1.2 k ohms maximum

  Specification, Throttle depressed: "INFINITE" ohms

Vehicles with automatic transmission

- Measure sensor resistance between connector terminals 5 + 6.

  Specification, Closed Throttle position: "INFINITE" ohms

  Specification, Throttle depressed: 0.8 to 1.2 k ohms maximum

All vehicles

If specifications not obtained:

- Replace Throttle Position (TP) sensor -G79-. See **ACCELERATOR MECHANISM, SERVICING** (item - 2 -).

If specifications obtained:

- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.

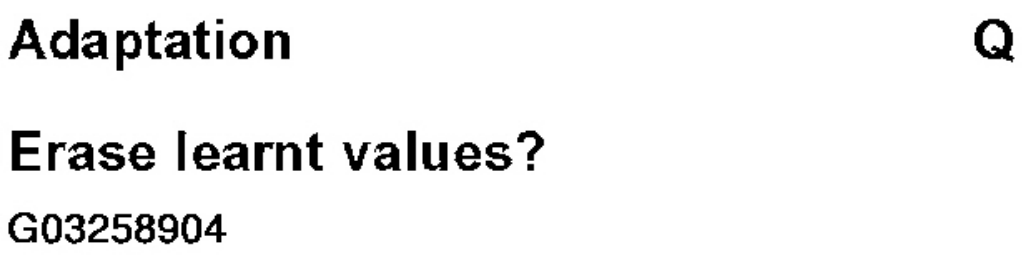

Fig. 16: Connecting VAG 1598/22 Test Box To Engine Control Module Harness Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.

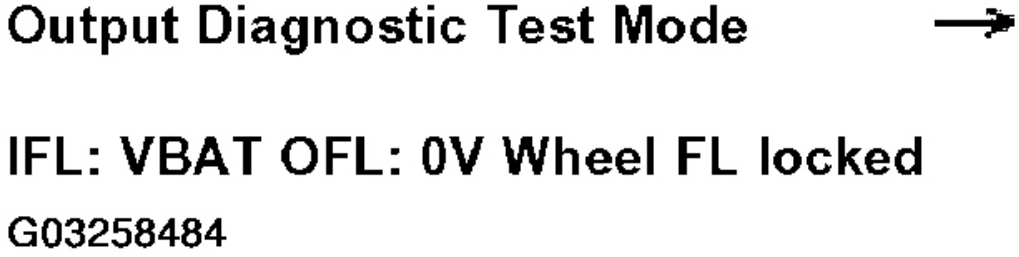

Fig. 17: Identifying Throttle Position Sensor Harness Connector Terminal
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 24
- Terminal 2 + socket 11
- Terminal 3 + socket 23
- Terminal 4 + socket 12
- Terminal 6 + socket 25

Vehicles with automatic transmission only:

- Terminal 5 + socket 8

From MY 2000

- Terminal 1 + socket 63
- Terminal 2 + socket 12
- Terminal 3 + socket 50
- Terminal 4 + socket 69
- Terminal 6 + socket 70

Vehicles with automatic transmission only:

- Terminal 5 + socket 51

Wire resistance: 1.5 ohms maximum

- Check wires for short to one another, to vehicle Ground and to battery positive (+).

  Specification: "INFINITE" ohms

If wiring OK

- Replace Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM) -J248-

  See Engine Control Module (ECM), Replacing .

THROTTLE POSITION SENSOR, ADJUSTING

(with sensor removed)

Adjusting cable cam

- Install cable disc in specific location

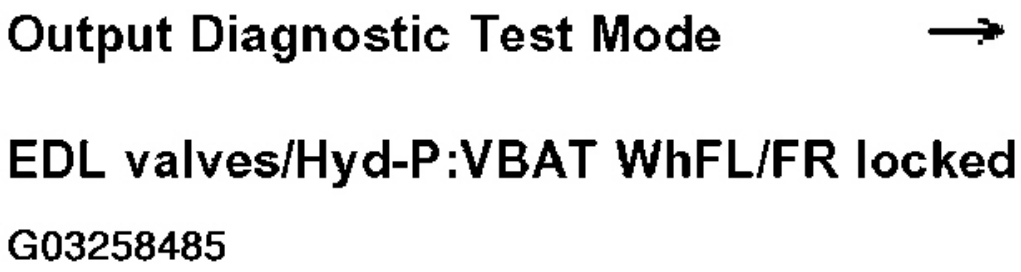

Fig. 18: Identifying Adjusting Cable Cam
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Attach Throttle Position (TP) sensor (with preassembled cable cam) to mounting block.
- Reconnect TP sensor 6-pin harness connector.

Fine adjustment with sensor installed

- Depress accelerator pedal by hand until accelerator pedal lies against accelerator pedal stop.

NOTE: For vehicles with automatic transmission: the pressure point or stop from the kick down switch must be felt before Wide Open Throttle is reached.

If accelerator pedal stop is not obtained or the pressure point of the kickdown switch can not be felt:

- Turn sensor in bracket slots.
- After adjusting TP sensor, check TP sensor function using VAG 1551/1552 Scan Tool. See **THROTTLE POSITION SENSOR, CHECKING** .

FUEL SUPPLY SYSTEM COMPONENTS, REMOVING AND INSTALLING

NOTE:

- **Hose connections are secured with either spring-type or clamp-type clips.**
- **Always replace clamp-type clips with spring-type clips.**
- **Fuel hoses in the engine compartment must be secured only with spring-type clips. The use of clamp or screw-type clips is not permitted.**
- **Assembly tool VAS 5024 or hose clip pliers V.A.G 1921 are recommended for installing spring-type clips.**

Servicing fuel filter, See **FUEL FILTER, SERVICING** .

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

Servicing accelerator mechanism, See **ACCELERATOR MECHANISM, SERVICING** .

FUEL TANK, REMOVING AND INSTALLING

NOTE: The following list refers to items in Fig. 1 .

1. **Cap**
2. **Seal**
   - Replace if damaged
3. **1 N.m**
4. **Tank flap unit**
   - With rubber cup
5. **Ground connection**
6. **O-ring**
   - Always replace
7. **Vent valve**
   - To remove valve unclip sideways out of support
   - Remove cap item 1 before installing
   - Checking, See **Fig. 3** .
8. **6 N.m**
9. **Protective cover**

- For filler neck

10. **Vent line**
    - Check for secure seating
11. **Clamping washer**
12. **Heat shield**
13. **Fuel tank cover**
14. **20 N.m plus an additional 90° (1/4 turn)**
    - Always replace
15. **Mounting strap**
    - Note different lengths
16. **Fuel tank**
    - When removing, support with engine/transmission jack V.A.G 1383 A
    - Removing and installing, See **FUEL TANK, REMOVING AND INSTALLING**
17. **Seal**
    - Replace if damaged
    - When installing, insert seal "dry" into fuel tank opening
    - Moisten inner edges of seal with fuel when installing fuel gauge sensor
18. **Fuel gauge sensor**
    - Observe installed position on fuel tank, See **Fig. 2**
    - Removing and installing, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
    - Check fuel gauge signal sensor, See **FUEL GAUGE SENSOR, CHECKING**
    - Check fuel pump. See **FUEL PUMP, CHECKING ELECTRICALLY** and **DELIVERY PRESSURE AND DELIVERY RATE OF FUEL PUMP, CHECKING** .
19. **Union nut**
    - Remove and install with key 3217
20. **Supply line**
    - Black
    - To fuel filter, See **FUEL FILTER, SERVICING**
    - Clipped onto fuel tank
    - Check for secure seating
    - Press locking ring inward to release fuel line of fuel gauge sensor
21. **Return hose**
    - Blue
    - From fuel cooler, See **FUEL COOLER, REMOVING AND INSTALLING**
    - Clipped onto fuel tank
    - Check for secure seating
    - Press locking ring inward to release fuel line of fuel gauge sensor

22. **Distance piece**
23. **Gravity/overflow valve**
    - Check valve for through flow:

      Valve vertical: Open,

      Valve tilted 45°: Closed

24. **10 N.m**

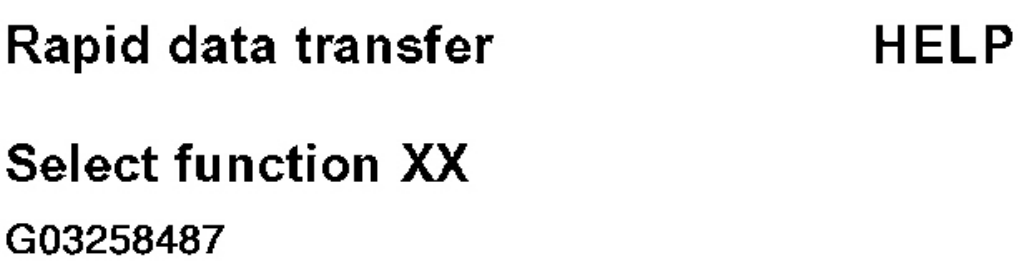

Fig. 1: Exploded View Of Fuel Tank Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Fuel gauge sensor, installed position

Mark on flange must align with mark on fuel tank (arrows).

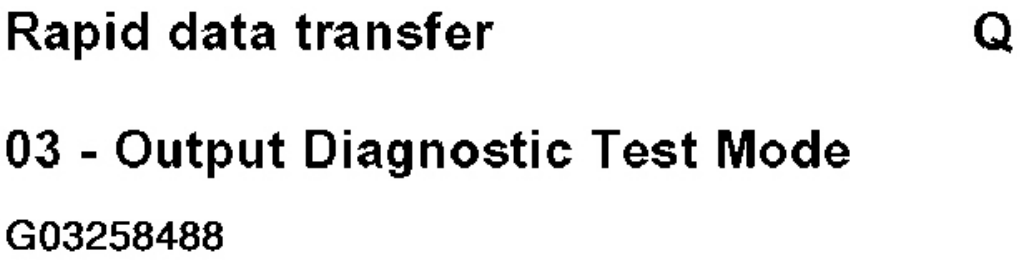

Fig. 2: Mark On Fuel Gauge Sensor Flange Must Align With Mark On Fuel Tank
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: After installing fuel gauge sensor, check that the supply -2- and return lines -1- are still clipped onto fuel tank.

Vent valve, checking

Lever in rest position: Closed

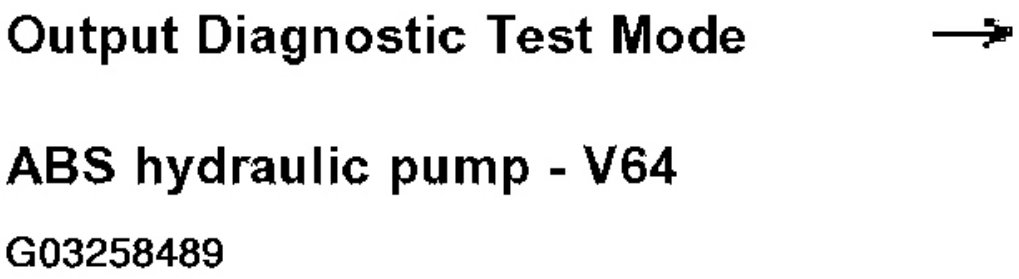

Fig. 3: Checking Vent Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Lever pushed in direction of arrow: Open

NOTE: Before installing breather valve, unscrew filler cap from fuel tank.

FUEL FILTER, SERVICING

The flow direction is marked by an arrow on the fuel hose, the preheat valve and the fuel filter.

NOTE: The following list refers to items in Fig. 4 .

1. **Return hose**
   - To fuel cooler, See **FUEL COOLER, REMOVING AND INSTALLING**
   - Open lower spring-type clamp
   - Blue or with blue marking
   - Check for secure seating
2. **Supply line**
   - From fuel tank
   - White or with white marking
   - Check for secure seating

3. **O-ring**
    - Always replace
4. **Securing clip**
    - Replace if damaged
5. **Protective plate**
    - Note installation position
6. **Control valve**
    - Installed position: Arrow points toward fuel tank
    - When changing filter, remove retaining clip and protective plate and take off preheat valve with hoses remaining connected. Replace O ring and coat with fuel before installing.
    - **Below + 15°C:**

      Passageway to filter open

    - **Over + 31°C:**

      Passageway to filter closed

7. **Return line**
    - From tandem pump
    - Open lower spring-type clamp
    - Check for secure seating
8. **Supply line**
    - To tandem pump
    - Check for secure seating
9. **Fuel filter**
    - Fill with diesel before installing
    - Flow direction is marked by arrows
    - Do not interchange connections
    - Replace if damaged
10. **Tensioning bolt, 2 N.m**
11. **Bracket**
    - Slide onto upper stop of fuel filter
12. **Water drain plug**
    - To bleed: remove retaining clip and protective plate and remove preheat valve with hoses remaining connected
    - Loosen and allow approx. 100 cc of fluid to drain
13. **Seal**
    - Replace if damaged.

14. **10 N.m**

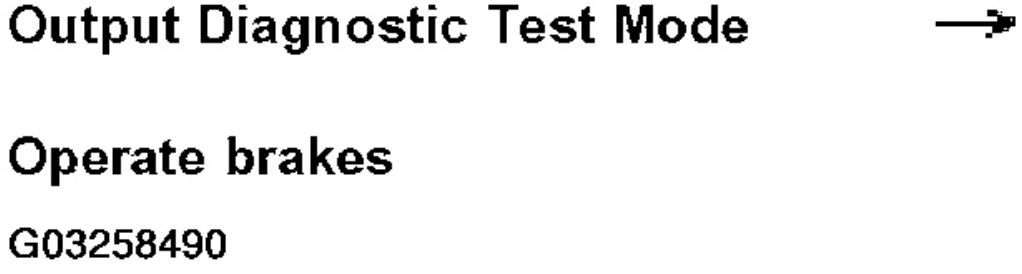

Fig. 4: Identifying Fuel Filter Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM

CAUTION: When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- **Route all types of hoses/lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.**
- **Ensure sufficient clearance to all moving or hot components.**

WARNING:

- **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- **The fuel system is under pressure! Before opening the system, place cloths around the connections. Then carefully loosen the connection to release pressure**
- **Wear eye and hand protection when performing any type of repair work on the fuel system!**

When removing and installing the fuel gauge sensor from a full or partly full fuel tank, observe the following:

- Before starting repairs, switch on exhaust extraction system and place an extraction hose close to the sensor opening in the fuel tank to extract escaping diesel fuel fumes. If no exhaust extraction system is available, a radial fan (as long as motor is not in air flow) with a displacement greater than 15 m^3 /h can be used.
- Avoid fuel contact with skin! Wear fuel-resistant gloves!

RULES FOR CLEANLINESS

When working on the fuel supply/injection system, pay careful attention to the following rules:

- Thoroughly clean all unions and adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.
- Make sure that no diesel fuel runs onto the coolant hoses. Immediately clean any accidental hose contamination. Affected hoses must be replaced.

FUEL COOLER, REMOVING AND INSTALLING

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

Special tools and equipment

- V.A.G 1331 Torque wrench (5 to 50 N.m)

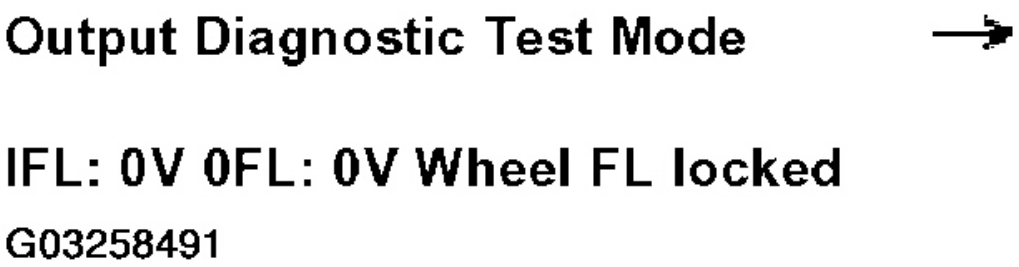

Fig. 5: Identifying Special Tools And Equipment (V.A.G 1331)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

NOTE: The fuel cooler is located in the fuel return line to the tank. It is located on the

vehicle underbody.

- Remove cover -A-.
- Separate fuel lines at fuel cooler.

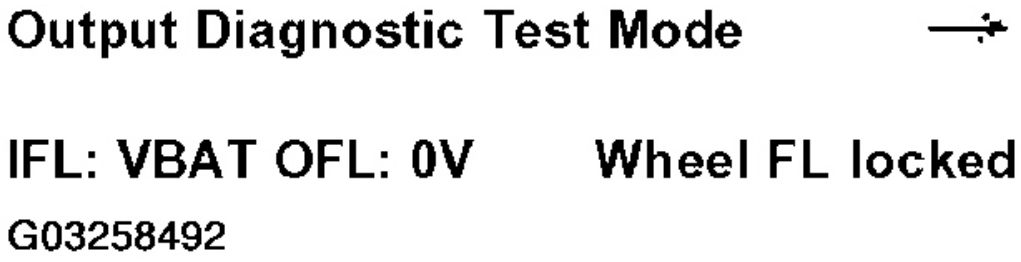

Fig. 6: Locating Fuel Cooler
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove securing nuts (arrows).

Installing

Installation is performed in the reverse sequence of removal. Note the following:

- Tighten fuel cooler securing nuts to 20 N.m.

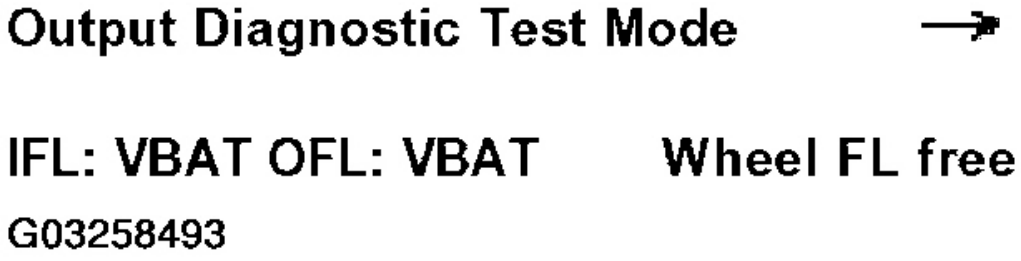

Fig. 7: Removing Fuel Cooler Securing Nuts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

FUEL DELIVERY UNIT, REMOVING AND INSTALLING

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

Special tools and equipment

- 3217 Ring nut wrench

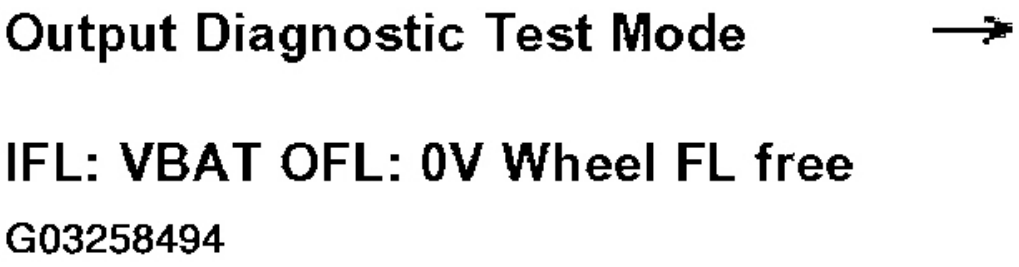

Fig. 8: Identifying Special Tools And Equipment (3217 Ring Nut Wrench)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground (GND) strap.
- Fold rear seat bench forward.
- Remove cover from fuel delivery unit.

WARNING:

- **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen the connection to release pressure**
- **Wear eye and hand protection when performing any type of repair work on the fuel system!**

- 4-pin connector as well as supply and return lines must be disconnected from the fuel delivery unit.

NOTE: Press locking ring inward to release fuel lines.

- Remove union nut with wrench 3217.
- Pull fuel gauge sensor and seal out of opening in fuel tank.

NOTE: If the delivery unit is to be replaced drain old delivery unit before disposal.

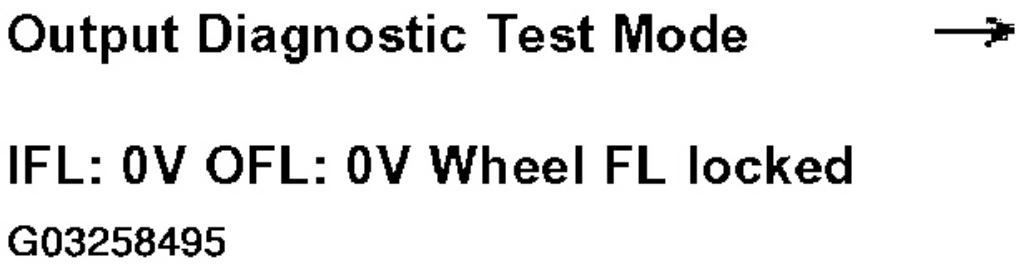

Fig. 9: Removing Fuel Gauge Sensor Union Nut With Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

- Installation of the fuel delivery unit is performed in reverse order.

NOTE:

- **Do not bend fuel sensor when installing.**
- **Insert fuel delivery unit seal dry into fuel tank opening.**
- **Moisten inner edges of seal with fuel only when installing fuel delivery unit.**
- **Note installation position of fuel gauge sensor: The marking on the fuel delivery unit must align with marking on fuel tank (arrows).**

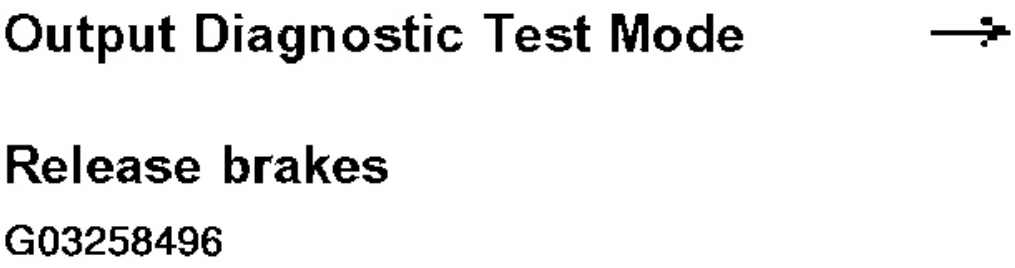

Fig. 10: Aligning Fuel Delivery Unit Marking With Marking On Fuel Tank
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- **After installing fuel delivery unit, check that the supply -2- and return lines -1- are still clipped onto fuel tank.**

- Check Diagnostic Trouble Code (DTC) memory. See **ENGINE CONTROL MODULE (DTC) MEMORY, READING AND ERASING** .

FUEL GAUGE SENSOR, REMOVING AND INSTALLING

Removing

- Remove fuel gauge sensor. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
- Unlock line connector -1 - and -2- and pull off.
- Lift up retaining tabs -3- and -4- using a screwdriver and pull fuel sensor off downward (arrows).

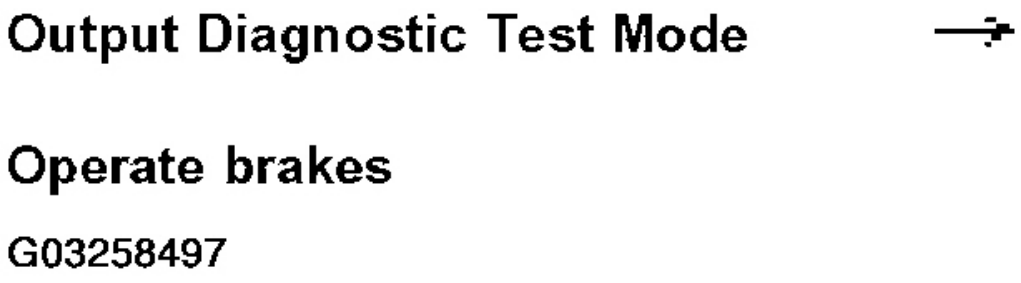

Fig. 11: Removing And Installing Fuel Delivery Unit Connectors

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

- Insert fuel gauge sender in guides on fuel gauge sensor and push up until it engages.
- Connect connectors and check for secure fit.
- Install fuel gauge sensor, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

FUEL GAUGE SENSOR, CHECKING

Special tools and equipment

- V.A.G 1526 Multimeter

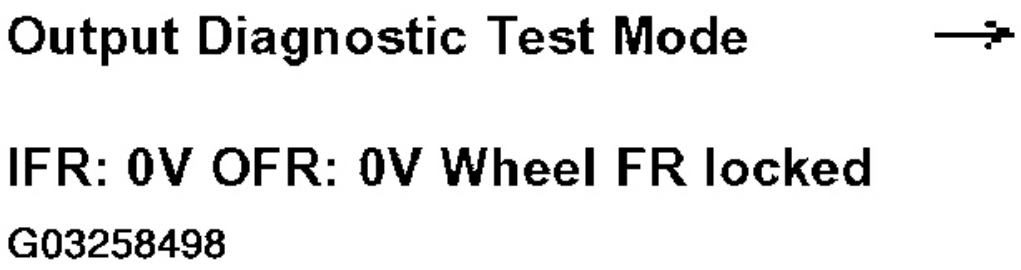

Fig. 12: Identifying Special Tools And Equipment (V.A.G 1526 Multimeter)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1594 A Adapter set

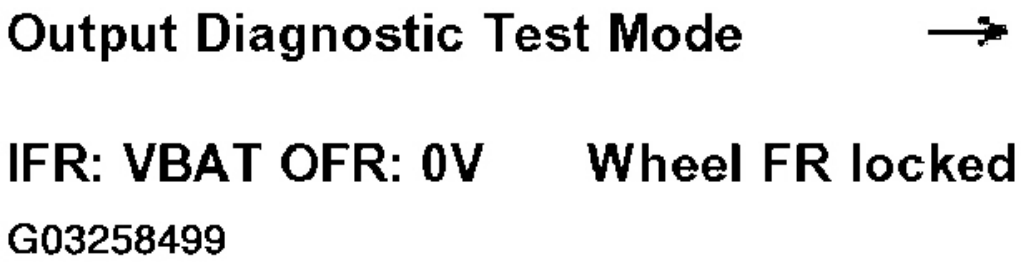

Fig. 13: Identifying Special Tools And Equipment (V.A.G 1594 A Adapter Set)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Work sequence

- Remove cover from fuel gauge sensor.
- Disconnect 4-pin connector from flange on fuel gauge sensor.
- Measure resistance at contacts -2- and -3- on sealing flange.

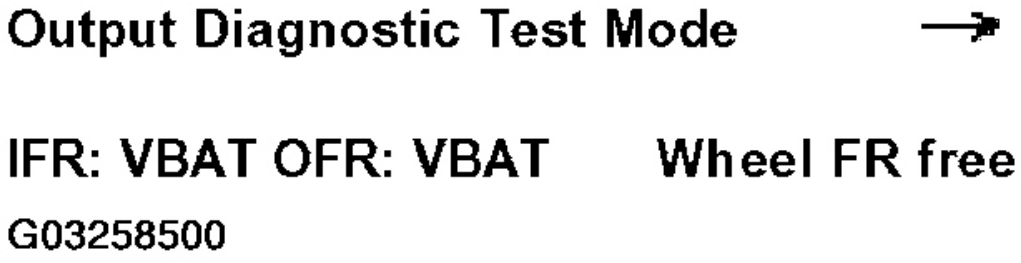

Fig. 14: Measuring Resistance At Contacts -2- And -3- On Fuel Gauge Sensor Sealing Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

FUEL GAUGE SENSOR RESISTANCE

Sensor	Fuel tank full	Fuel tank empty
Fuel gauge sensor	295 ohms	52 ohms

With a fuel gauge between "full" and "empty" there must be indicated a resistance value between both specifications.

If 0 ohm or infinite ohms is measured, there is a wiring open or short circuit.

NOTE: To check the resistance values "full" or "empty", the fuel gauge sensor must be removed and the sensor float moved to the upper or lower stop. See FUEL GAUGE SENSOR, REMOVING AND INSTALLING .

FUEL TANK, REMOVING AND INSTALLING

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

Special tools and equipment

- V.A.G 1331 Torque wrench (5 to 50 N.m)

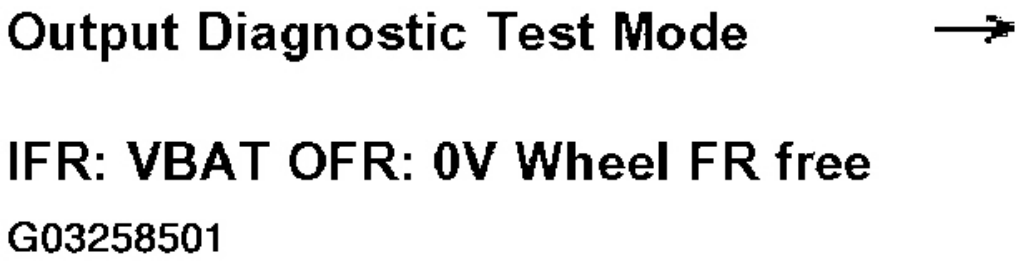

Fig. 15: Identifying Special Tools And Equipment (V.A.G 1331 Torque Wrench)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1383 A Engine/transmission jack

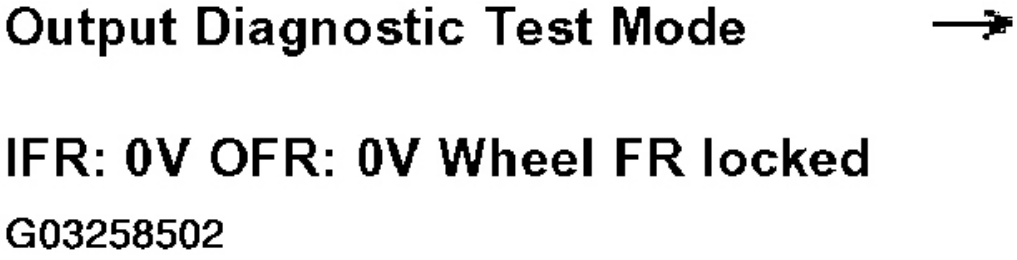

Fig. 16: Identifying Special Tools And Equipment (V.A.G 1383 A Engine/Transmission Jack)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Open fuel flap.
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground (GND) strap.
- Remove tank flap unit with rubber cup.

See **FUEL TANK FILLER FLAP UNIT, REMOVING AND INSTALLING** .

- Fold rear bench seat forward.
- Remove cover from fuel gauge sensor and separate connection.
- Remove rear axle:

  See **AXLE BEAM** .

- Remove rear right wheelhouse liner:

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW** .

- Unscrew protective cover -1- (arrows).

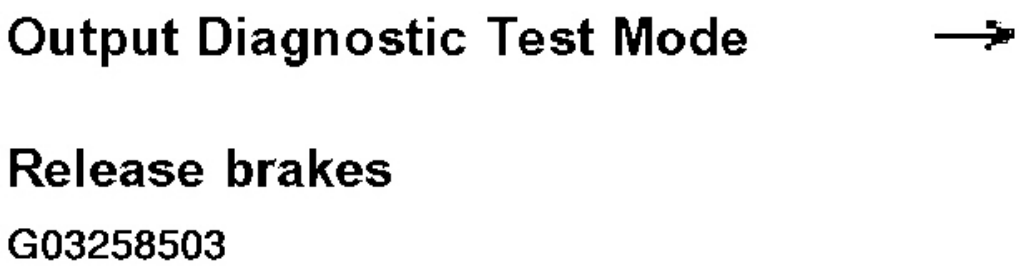

Fig. 17: Unscrew Protective Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove cover for fuel tank (arrows).

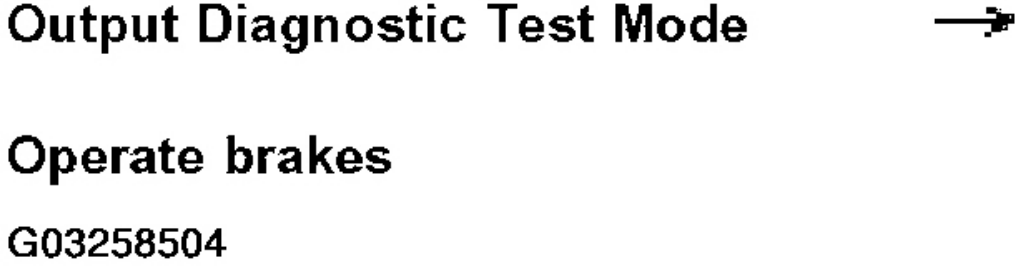

Fig. 18: Removing Fuel Tank Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Drain fuel tank and clean area of fuel filler neck (unscrew filler cap).
- Disconnect breather lines/hoses on filler neck.
- Remove gravity valve from its retainer.
- Remove mounting screws on filler neck.

WARNING:

- **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen the connection to release pressure.**
- **Wear eye and hand protection when performing any type of repair work on the fuel system!**

- Disconnect supply and return lines on right front of fuel tank.

NOTE: Press locking ring inward to release fuel lines (arrows).

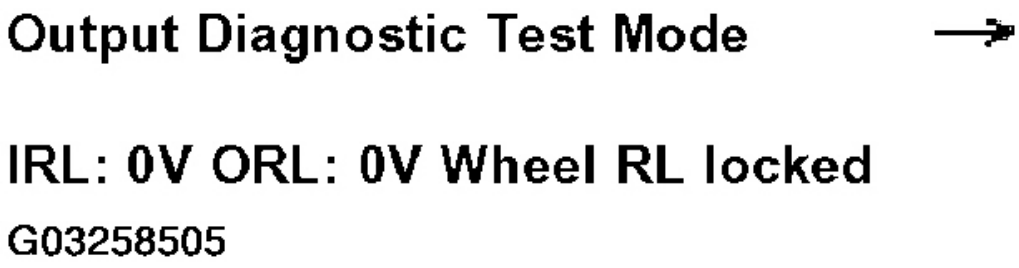

Fig. 19: Disconnecting Supply And Return Lines On Right Front Of Fuel Tank
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Seal lines so that fuel system is not contaminated by dirt etc.
- Remove tensioning strap. When doing this support fuel tank with engine/transmission jack V.A.G 1383 A.
- Lower fuel tank. Guide vent hoses/lines through longitudinal member.

Installing

Installation is performed in the reverse order. Note the following:

- Route breather and fuel lines free of kinks.
- Make sure fuel lines/hoses are installed securely.
- Guide vent hoses/lines through opening in longitudinal member (install line guide).
- Secure breather hoses/lines to filler neck with spring-type clamps.
- Do not interchange supply and return hose (return hose blue, supply hose black).
- Clip supply and return line onto fuel tank.

FUEL PUMP, CHECKING ELECTRICALLY

Special tools and equipment

- V.A.G 1527 B Diode test lamp

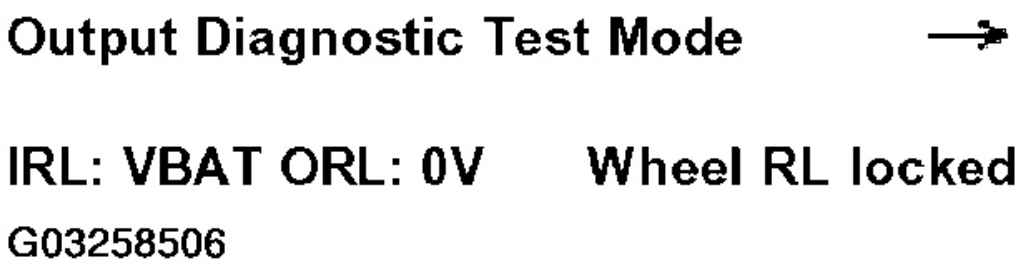

Fig. 20: Identifying Special Tools And Equipment (V.A.G 1527 B Diode Test Lamp)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1715 Multimeter
- Wiring diagram

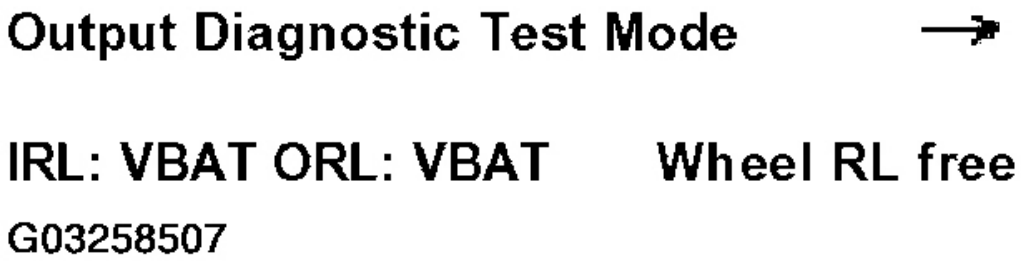

Fig. 21: Identifying Special Tools And Equipment (V.A.G 1715 Multimeter)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Requirements

- Battery charge at least 11.5V
- Fuses OK
- All electrical consumers, e.g. lights and rear window defogger are switched off

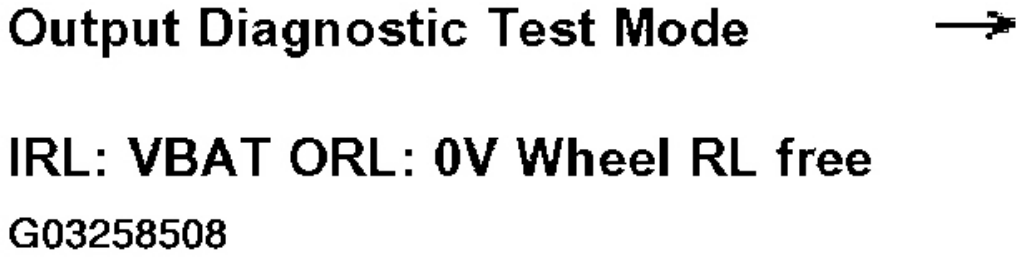

Fig. 22: Identifying Fuses (Behind Trim Panel On Far Left Side Of Dash)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking function and voltage supply

- Remove cover from fuel gauge sensor.
- Switch ignition on. Fuel pump must be heard to run for approx. 2 seconds.
- Switch ignition off.

If fuel pump does not run:

- Disconnect 4-pin connector from flange on fuel gauge sensor.
- Connect diode test lamp V.A.G 1527 with adapter cables from V.A.G 1594 to outer contacts of connector.

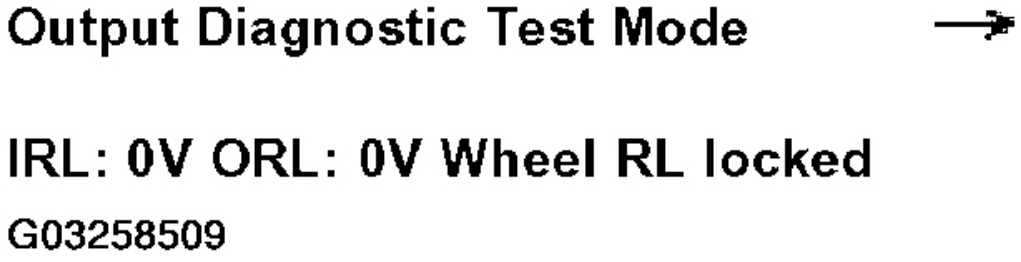

Fig. 23: Connecting Diode Test Lamp With Adapter Cables To Outer Contacts Of Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ignition on.

  LED must light up for approx. 2 seconds.

LED does not light up:

- Check activation of fuel pump relay and check wiring for open and short circuit.

  See appropriate System Wiring Diagrams article.

LED lights up (voltage supply OK.):

- Remove fuel gauge sensor, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
- Check that electrical wires between flange and fuel pump are connected and for continuity.

If no open circuit can be found:

- Fuel pump faulty, replace fuel gauge sensor, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

Checking current draw of fuel pump

- Disconnect 4-pin connector on fuel gauge sensor.
- Set multimeter to measuring range 20 A and make a series connection between connector contacts -1- and fuel pump using adapter cables from V.A.G 1594 A.

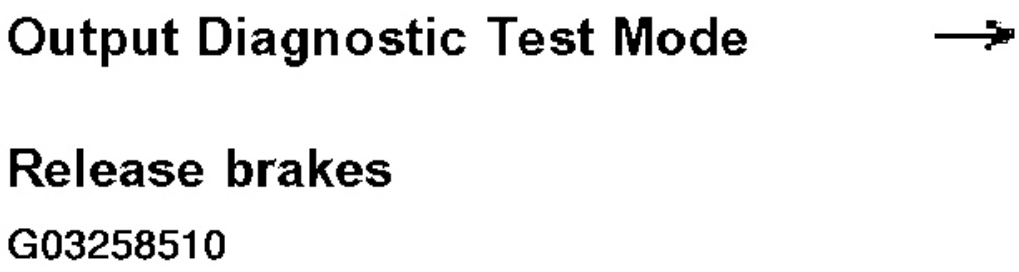

Fig. 24: Checking Current Draw Of Fuel Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The current clamp of multimeter V.A.G 1715 can be connected between contacts -1- of connector and fuel pump, as an alternative solution.

- Bridge contact -4- of connector and fuel pump using adapter cables from V.A.G 1594 A.
- Start engine and run at idling speed.
- Measure current draw of fuel pump. Specification: 3.5 to 4.5 Amps

If the measured value is out of specification:

- Replace fuel gauge sensor, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

DELIVERY PRESSURE AND DELIVERY RATE OF FUEL PUMP, CHECKING

NOTE: If irregularities occur when driving at high speed and:

- **no faults are stored in the control module DTC memory (see ENGINE CONTROL MODULE (DTC) MEMORY, READING AND ERASING).**
- **tandem pump is OK (See TANDEM PUMP, CHECKING)**
- **and fuel filter change intervals are kept,**

the delivery pressure and delivery rate of fuel pump must be checked.

Special tools and equipment

- 3217 Ring nut wrench
- V.A.G 1318 Pressure gauge
- V.A.G 1318/1 Adapter
- V.A.G 1318/11 Adapter
- V.A.G 1318/17 Adapter
- V.A.G 1318/23 Adapter

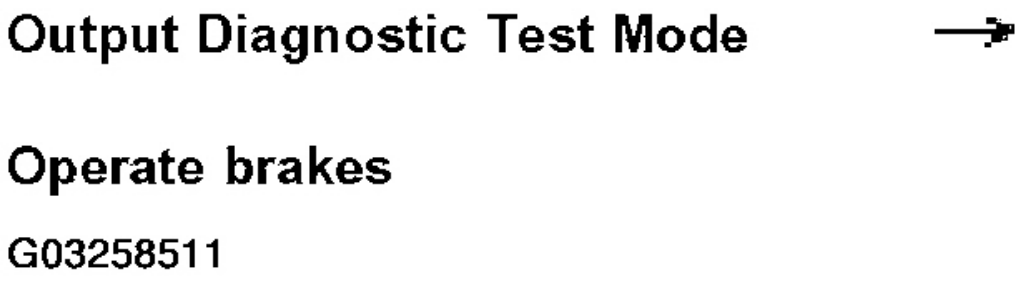

Fig. 25: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1348/3 A Remote control

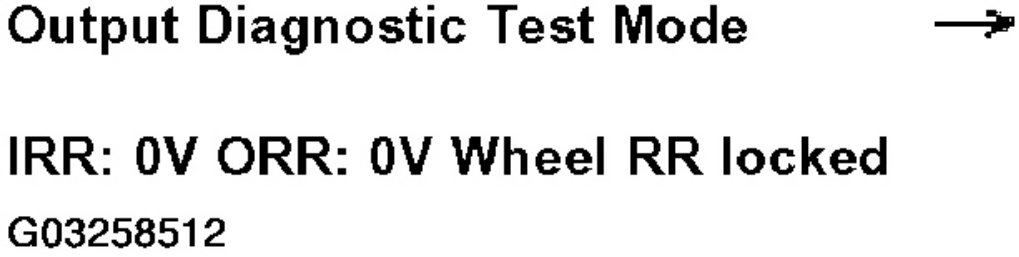

Fig. 26: Identifying Special Tools And Equipment (V.A.G 1348/3 Remote Control)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1594 A Adapter set

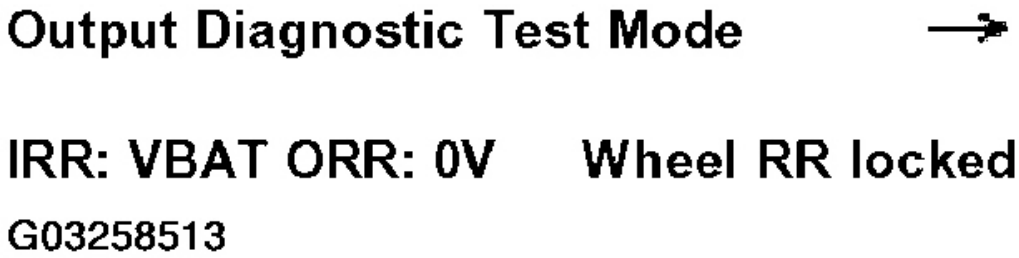

Fig. 27: Identifying Special Tools And Equipment (V.A.G 1594 Adapter Set)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Requirements

- Voltage supply OK.
- Battery charge at least 12.5 V
- Fuel temperature 15°C to 30°C
- Fuel according to DIN EN 590 - no biodiesel
- Fuel tank filled at least 1/4

Work sequence

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

Connect remote control

- Remove cover from fuel gauge sensor.
- Disconnect 4-pin connector on fuel gauge sensor.
- Connect remote control V.A.G 1348/3 A with adapter cables from V.A.G 1594 A to fuel pump contact -1- and battery positive (+).
- Bridge contact -4- of connector and fuel pump using adapter cables from V.A.G 1594 A.

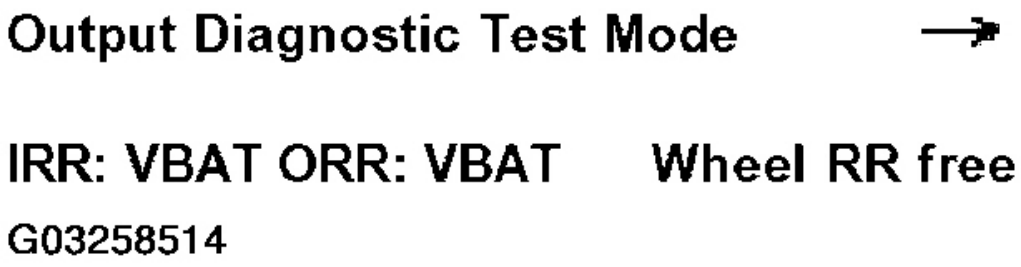

Fig. 28: Connecting Remote Control With Adapter Cables To Fuel Pump Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking delivery pressure and delivery rate

- Pull fuel supply hose -1 - off fuel line at suspension strut and connect pressure gauge V.A.G 1318 with adapter V.A.G 1318/23 and V.A.G 1318/17-8 to fuel line.

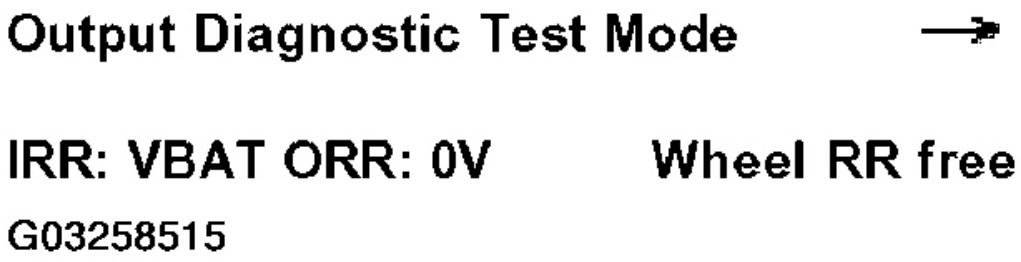

Fig. 29: Checking Fuel Delivery Pressure
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Push hose V.A.G 1318/1 onto adapter V.A.G 1318/11 on pressure gauge and hold hose in a measuring container.
- Close shut-off tap of pressure gauge (item -A-).
- Operate remote control again for approx. 5 seconds.

There must be measured a pressure of 0.5 +/- 0.1 bar in pressure gauge.

If delivery pressure is not achieved:

- Check fuel line to fuel gauge sensor.

If delivery pressure OK:

- Replace fuel gauge sensor, See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

When delivery pressure is achieved, check delivery rate as follows:

- Open shut-off tap on pressure tester. Lever then points in through flow direction -B-.

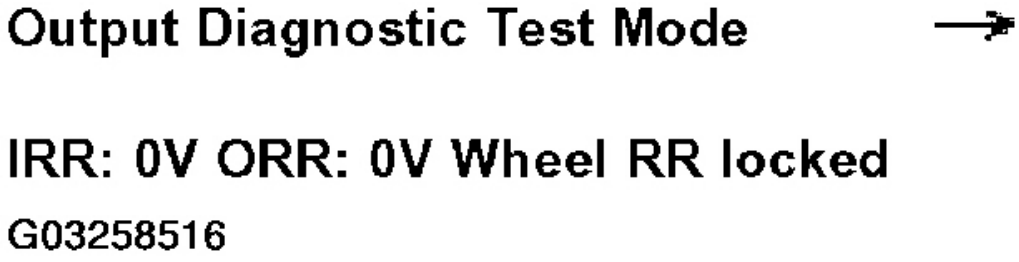

Fig. 30: Checking Fuel Delivery Rate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate remote control V.A.G 1348/3A. Close shut-off tap slowly, until pressure gauge shows 0.2 bar pressure.
- Do not continue to operate remote control. From this point on do not move position of shut-off tap.
- Empty measuring container and position under drain hose again.
- Operate remote control for 30 seconds and measure fuel quantity.

  Specification: at least 660 ml/30 s.

If the minimum delivery rate is not attained:

- Check fuel line to fuel gauge sensor.

If delivery rate is OK:

- Replace fuel gauge sensor. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

TANDEM PUMP, CHECKING

Special tools and equipment

- VAS 5187 Pressure gauge

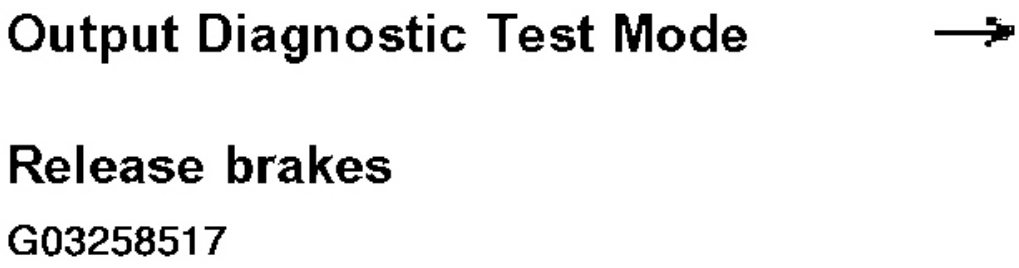

Fig. 31: Identifying Special Tools And Equipment (VAS 5187 Pressure Gauge)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1331 Torque wrench (5 to 50 N.m)
- VAS 5051 Vehicle diagnostic, testing and information system with diagnostic cable VAS 5051/5A or VAS 5051/6A

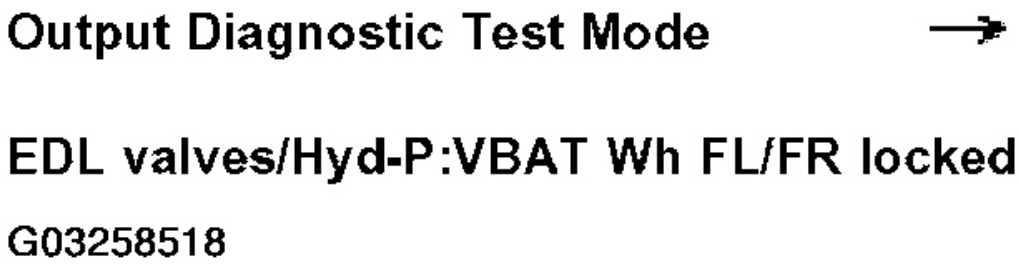

Fig. 32: Identifying Special Tools And Equipment (V.A.G 1331 Torque Wrench)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Requirements

- Coolant temperature at least 85 C
- Unit injectors OK

Work sequence

- Unscrew sealing plug (arrow).

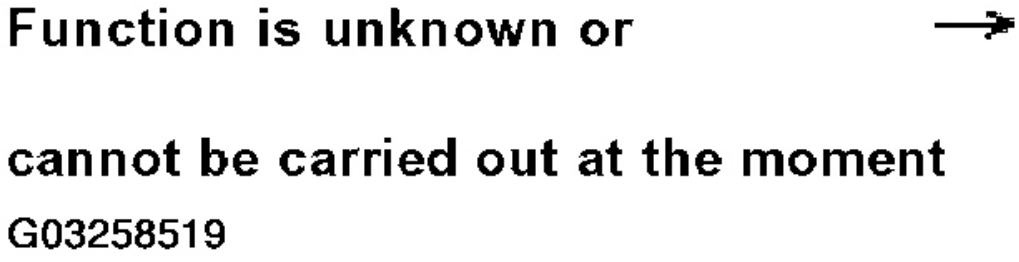

Fig. 33: Unscrew Sealing Plug On Tamdem Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect pressure gauge VAS 5187 as shown in **Fig. 34** .

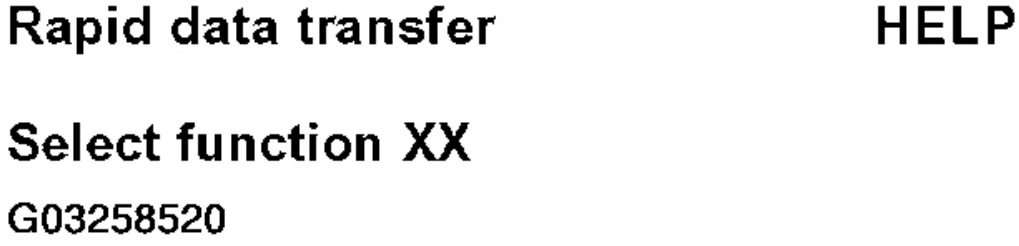

Fig. 34: Connecting VAS 5187 Pressure Gauge
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Start engine and run at idling speed.
- Connect vehicle diagnostic, test and information system VAS 5051 and select operating mode "vehicle self-diagnosis". Enter control module engine electronics with address word "01".
- Select diagnostic function "08-Read measured value block".
- Enter via number keys display group "2" and confirm with Q key.
- Read idling speed in display zone 1.
- Increase engine speed to above 1500 rpm.
- Observe indicated pressure on gauge.

Specification: at least 3.5 bar.

- Press <--key.
- Press function 06-"End output".
- Switch ignition off.

If specification is not obtained:

- Replace tandem pump. See **TANDEM PUMP, REMOVING AND INSTALLING** .

NOTE: Tighten the sealing plug to 25 N.m after having removed the pressure gauge. Always replace the sealing ring.

TANDEM PUMP, REMOVING AND INSTALLING

Observe safety precautions, See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

Special tools and equipment

- V.A.G 1331 Torque wrench (5 to 50 N.m)
- V.A.G 1390 Vacuum pump
- V.A.G 1390/1 Fluid receptacle
- V.A.G 1921 Pliers for spring-type hose clips or VAS 5024 Assembly tool for spring-type clips

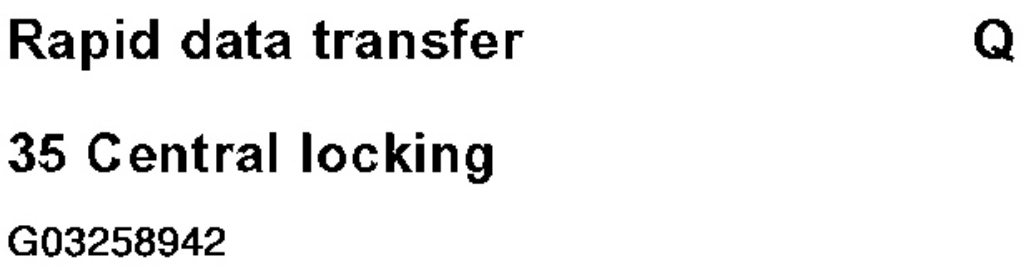

Fig. 35: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

WARNING:
- **The fuel and the fuel lines in the fuel system can become very hot**

(danger of scalding)!

- **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen the connection to release pressure.**
- **Wear eye and hand protection when performing any type of repair work on the fuel system!**

- Pull supply hose -1- (white marking) and return hose -2- (blue marking) off fuel lines on cylinder head.
- Attach hand vacuum pump V.A.G 1390 with bleed bottle V.A.G 1390/1 to return hose -3-.

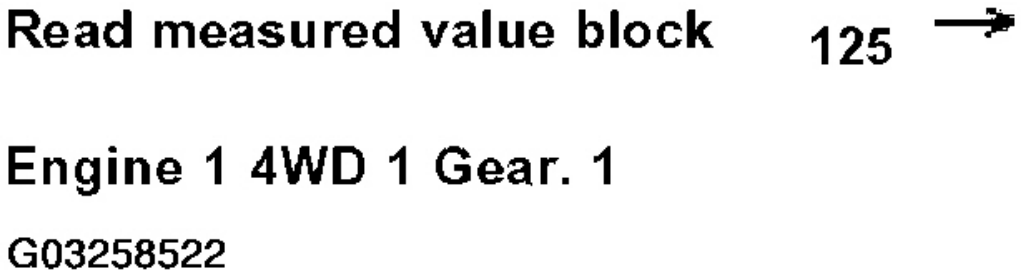

Fig. 36: Attaching Hand Vacuum Pump V.A.G 1390 With Bleed Bottle V.A.G 1390/1 To Return Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate hand vacuum pump until no fuel is coming out of return hose. Observe that no fuel is siphoned into hand vacuum pump.
- Remove vacuum hose -1 - from brake booster of tandem pump -4-.
- Remove supply hose -2- (white marking) from tandem pump -4-.
- Remove securing bolts (arrow).
- Remove tandem pump -4- from cylinder head.
- Pull tandem pump -4- upward slightly, pull return hose -3- off (blue marking) and remove tandem pump -4-.

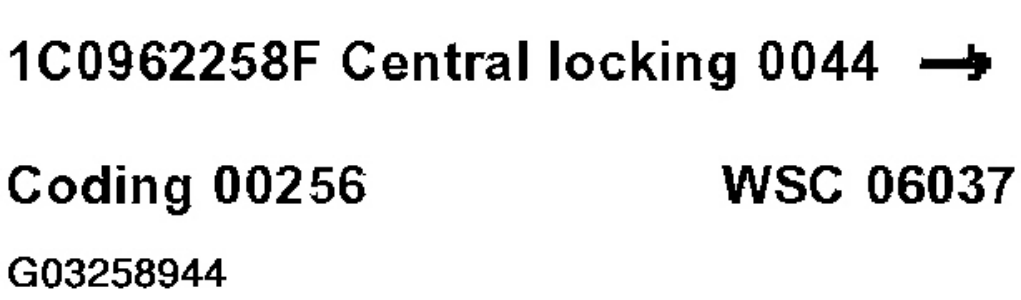

Fig. 37: Removing Tandem Pump Securing Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

Installation is performed in reverse order. Note the following:

- Observe correct seat of tandem pump coupling in the camshaft.
- Always replace tandem pump seals.

- Connect return hose -3- (blue marking) to tandem pump return connection.
- Install tandem pump and tighten upper securing bolts to 20 N.m.
- Tighten lower securing bolts to 10 N.m.
- Connect supply hose -2- (white marking) to supply connection and vacuum line -1- of brake booster to tandem pump -4-.

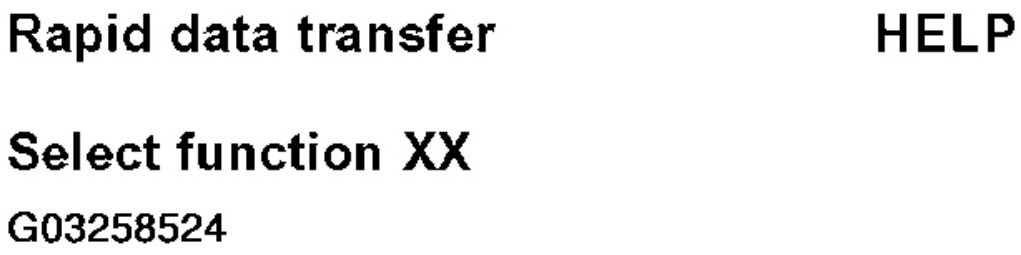

Fig. 38: Tightening Tandem Pump Lower Securing Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect supply hose -1- (white marking) to fuel line of cylinder head.
- Attach hand vacuum pump V.A.G 1390 with bleed bottle V.A.G 1390/1 to return hose -3-. See **Fig. 39** .
- Operate hand vacuum pump until no fuel is coming out of return hose -3-. Observe that no fuel is siphoned into hand vacuum pump.
- Connect return hose -2- (blue marking) to return hose -3-.

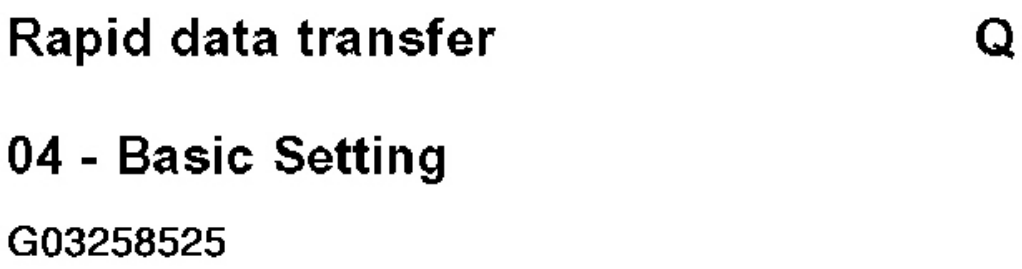

Fig. 39: Attaching Hand Vacuum Pump V.A.G 1390 With Bleed Bottle V.A.G 1390/1 To Return Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ACCELERATOR MECHANISM, SERVICING

NOTE: The following list refers to items in Fig. 40 .

1. **Mounting**
2. **Connector**
   - Black, 6-pin
3. **10 N.m**
4. **Throttle Position (TP) Sensor -G79-**
   - Can not be adjusted
   - Sensor passes position of pedal on to engine control module
   - Remove footwell cover to remove sensor
5. **Bracket**
   - For footwell cover
   - Clipped securely onto accelerator pedal (TP) position sensor

Fig. 40: Identifying Accelerator Mechanism Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

FUEL SUPPLY SYSTEM, SERVICING

FUEL SUPPLY SYSTEM, GENERAL INFORMATION

NOTE:

- **Hose connections are secured with either spring-type or clamp-type clips.**
- **Always replace clamp-type clips with spring-type clips.**
- **Fuel hoses of engine must only be secured with spring type clips. The use of clamp or screw-type clips is not permitted.**
- **Fuel extraction unit VAS 5190 is recommended to empty fuel tank.**

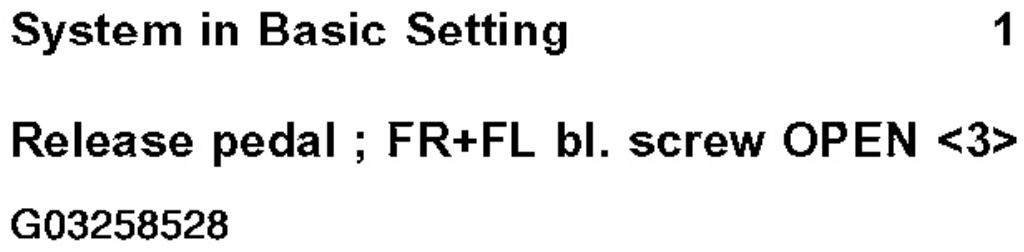

Fig. 1: Identifying Special Tool (1 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- **Always replace clamp-type clips with spring-type clips. Assembly tool VAS 5024 or hose clip pliers V.A.G 1921 are recommended for installing spring-type clips.**

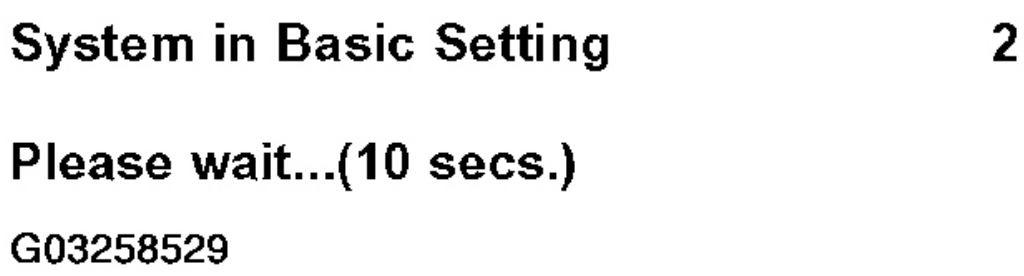

Fig. 2: Identifying Special Tool (2 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing and installing fuel tank with attachments and fuel filter. See **FUEL TANK AND ATTACHMENTS / FUEL FILTER, REMOVING AND INSTALLING** .

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

Servicing accelerator mechanism. See **ACCELERATOR MECHANISM, SERVICING**

Models without EPC

Adjusting accelerator cable. See **ACCELERATOR CABLE, ADJUSTING** .

Vehicles with Electronic Power Control (EPC)

Checking electronic accelerator (EPC). See **ELECTRONIC POWER CONTROL (EPC)**

Continuation for all models

Observe crash fuel shut-off. See **CRASH FUEL SHUT-OFF** .

Servicing parts of the Evaporative Emissions (EVAP) system. See **EVAP SYSTEM COMPONENTS, SERVICING** .

FUEL TANK AND ATTACHMENTS / FUEL FILTER, REMOVING AND INSTALLING

NOTE: The following list refers to items in Fig. 3 .

1. **Cover**
2. **Seal**
   - Replace if damaged
3. **1 N.m**
4. **Tank flap unit**
   - With rubber cup
5. **10 N.m**
6. **Breather pipe**
7. **Change-over valve**
   - To remove valve unclip sideways out of socket
   - Remove cap item -1- before installing
   - Check. See **Checking Change-Over Valve**
8. **O-ring**
   - Replace if damaged
9. **To EVAP canister**
   - See **EVAP SYSTEM COMPONENTS, SERVICING**
10. **Cable guide**
    - In longitudinal member
11. **Breather pipe**
    - Check if seated securely
    - Secure with spring-type clips
12. **Fuel tank**
    - When removing, support with engine/transmission jack V.A.G 1383 A
      - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
13. **Heat shield**
    - For fuel tank
14. **Clamping washer**
15. **Fuel tank cover**
16. **20 N.m + 1/4 turn (90°) further**
    - Replace
17. **Securing strap**
    - Note differing lengths
    - Installed position: Fixing point (holes) point in direction of travel (forward)
18. **Fuel filter**
    - Installed position: Arrow points in direction of flow

    Engine codes BEV, BGD:

- Removing and installing fuel pressure regulator. See **Removing And Installing Fuel Pressure Regulator**
- If fuel filter has been replaced, fuel system must be bled. See **FUEL SYSTEM, BLEEDING** .

19. **Screw-type clip**
    - Observe installed position. See **Installed Position Of Screw-Type Clamp For Fuel Filter**
20. **Supply line**
    - Black
    - Check if seated securely
    - To pull off of fuel filter press locking ring inward on connecting piece
21. **Breather pipe**
    - White
    - Clipped onto top of fuel tank
    - Check if seated securely
    - To EVAP canister purge regulator valve -N80-.
22. **Seal**
    - Replace if damaged
    - When installing, insert seal dry into fuel tank opening
    - Moisten with fuel only when installing fuel delivery unit flange.
23. **Fuel delivery unit**
    - Observe installed position of flange on fuel tank. See **Installed Position Of Flange Of Fuel Delivery Unit** .
    - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
    - Removing and installing fuel gauge sender. See **FUEL GAUGE SENDER, REMOVING AND INSTALLING** .
    - Checking fuel pump. See **FUEL PUMP, CHECKING** .
    - Clean strainer if soiled
24. **Union nut, 75 N.m**
    - Remove and install with key 3217
25. **Supply line**
    - Black
    - Check if seated securely
    - Clipped onto side of fuel tank
    - When pulling off flange and fuel filter press locking ring on connecting piece
26. **Return line**
    - Blue or with blue marking
    - Clipped onto side of fuel tank
    - Check if seated securely
    - To remove from flange press release button on connecting piece

Engine codes BEV, BGD:

- From fuel filter

All other engines:

- From fuel return line on fuel rail

27. **Gravity valve**
    - To remove valve unclip upward out of support
    - Check valve for through flow, Valve vertical: Open; Valve tilted 45° : Closed
28. **Pressure retention valve**
    - For fuel tank breather
    - Checking. See **Checking Pressure Retention Valve**
29. **Ground connection**
    - Check if seated securely

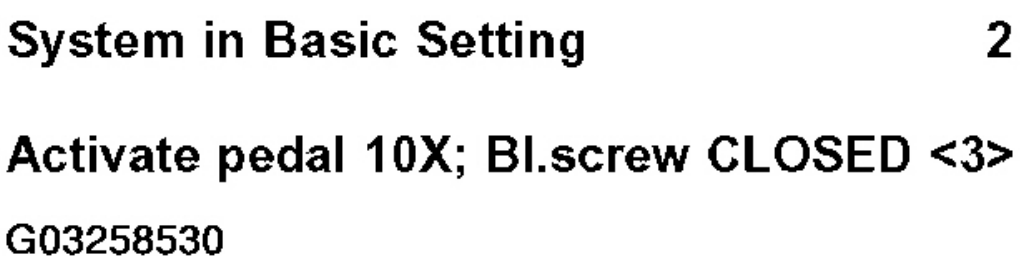

Fig. 3: Exploded View Of Fuel Tank/Fuel Filter Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installed Position Of Flange Of Fuel Delivery Unit

Marking on sender must align with the marking on fuel tank (arrows).

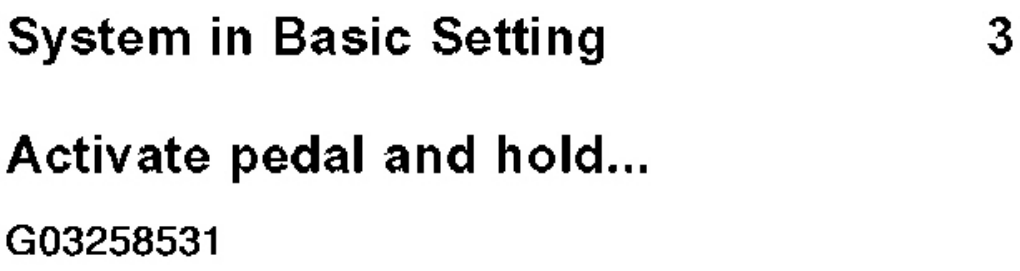

Fig. 4: Aligning Fuel Delivery Unit Flange With The Marking On Fuel Tank
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Blue or blue marked return line -1- to connection with identification -R-.

Black supply line -2- to connection with identification -V-.

NOTE: After installing fuel delivery unit flange, check that the supply, return and breather pipes are still clipped onto the fuel tank.

Checking Change-Over Valve

Lever in rest position: Closed

Lever pushed in direction of arrow: Open

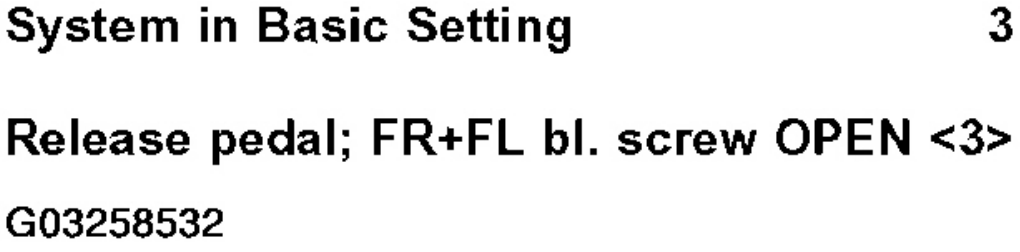

Fig. 5: Checking Change-Over Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Before installing vent valve remove cap from fuel tank.

Checking Pressure Retention Valve

The pressure retention valve is opened in both through-flow directions from the gravity valve/pressure retention valve (arrow -1-).

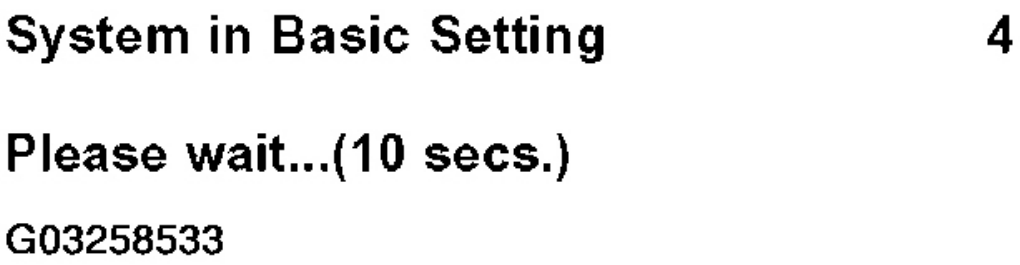

Fig. 6: Checking Pressure Retention Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

It is opened only in one through-flow direction from the EVAP system/solenoid valve junction piece (arrow -2-).

Checking direction of valve flow. See **CHECKING DIRECTION OF VALVE FLOW** .

Checking direction of valve flow

NOTE: The following list refers to items in Fig. 6 .

A. Union 1 1:
   - Flow in both directions
   - Union -2- is closed

B. Union 1 - 2:
   - Flow in both directions
   - Union - 3 is closed

C. Union 1 2:
   - Flow in only one direction
   - Union -3- is closed
   - Valve must close when a vacuum is applied to union -1-

Installed Position Of Screw-Type Clamp For Fuel Filter

NOTE: The fuel filter is illustrated viewed from the front.

- Install screw-type clamp (arrow) as shown in illustration.

  Ensure sufficient clearance between clamp fastener and fuel tank:

  Dimension "a" must be at least 5 mm

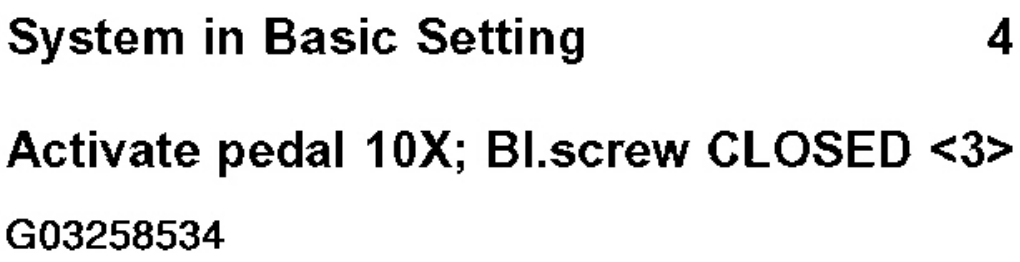

Fig. 7: Identifying Installed Position Of Screw-Type Clamp For Fuel Filter
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing And Installing Fuel Pressure Regulator

NOTE: The following list refers to items in Fig. 8 .

1. Fuel filter
   - Arrows show flow direction
2. Rubber hose
3. Retaining clip
   - Check if seated securely
4. Ground strap
   - Mounted on fuel filter retainer
5. Supply pipe
   - From fuel pump
6. Return pipe
   - To fuel pump
7. Fuel pressure regulator

- Checking. See **FUEL PRESSURE REGULATOR AND HOLDING PRESSURE, CHECKING** .

8. Seal
    - Replace
9. O-ring
    - Replace
10. Supply pipe
    - To union in fuel tank

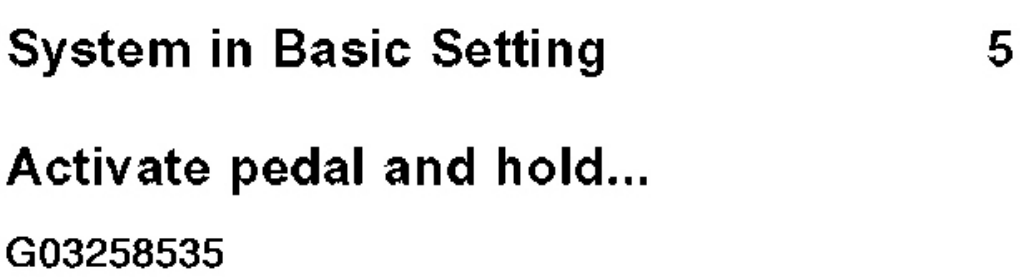

Fig. 8: Exploded View Of Fuel Filter & Fuel Pressure Regulator Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM

CAUTION: When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- **Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.**
- **Ensure sufficient clearance to all moving or hot components.**

When removing and installing the fuel gauge sender or fuel pump (fuel delivery unit) from a full or partly full fuel tank the following must be observed:

WARNING: Fuel supply lines are under pressure! Before removing a hose connection wrap a cloth around the connection. Then release pressure by carefully pulling the hose off the connection.

- Before beginning work, switch on the exhaust extraction system and place an extraction hose close to the

sender opening in the fuel tank to extract escaping fuel fumes. If no exhaust extraction system is available, a radial fan with a displacement greater than 15 m3/h can be used (as long as motor is not in air flow).

- Prevent skin contact with fuel! Wear fuel-resistant gloves!
- For safety reasons, fuse No. 28 must be removed from fuse holder before opening fuel system because fuel pump can be activated by door contact switch in driver's door.

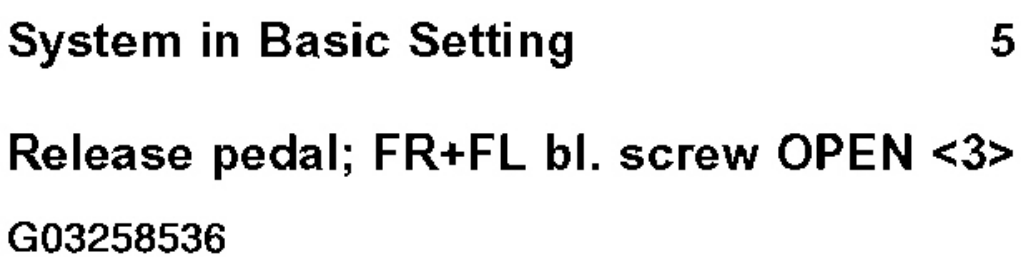

Fig. 9: Locating Fuse Box (Behind Access Panel At Far Left End Of Dash)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

RULES FOR CLEANLINESS

When working on the fuel supply/injection system, pay careful attention to the following 5 rules:

- Thoroughly clean all unions and the adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- Carefully cover opened components or seal, if the repair cannot be performed immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

FUEL DELIVERY UNIT, REMOVING AND INSTALLING

Special tools, equipment, testers, measuring instruments and auxiliary items required

- 3217 Union nut spanner

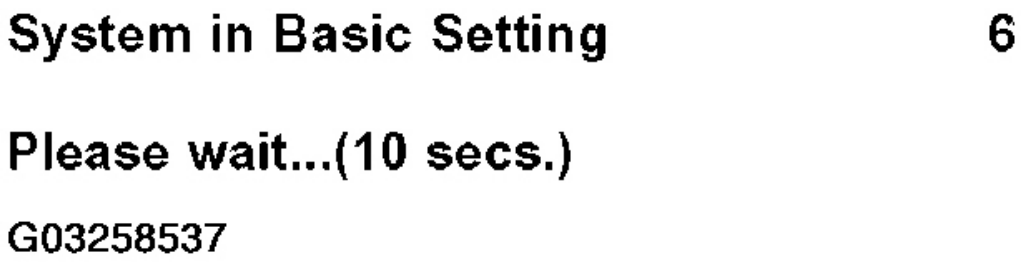

Fig. 10: Identifying 3217 Union Nut Spanner
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1332 Torque wrench (40-200 N.m)

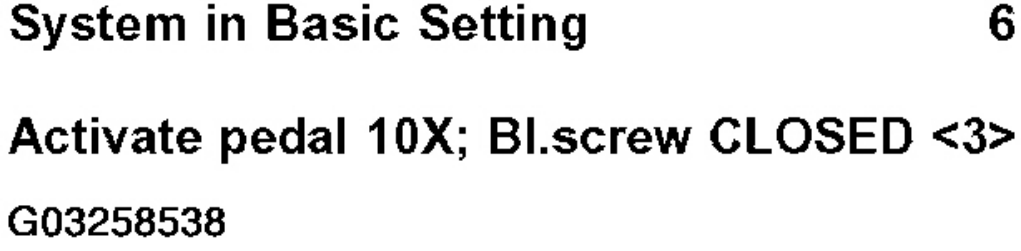

Fig. 11: Identifying V.A.G 1332 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

Requirements

- Fuel tank must only be a maximum 1/2 full.

NOTE:

- **If necessary empty fuel tank with fuel extraction unit VAS 5190**
- **Observe safety precautions before starting work. See SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM .**

WARNING: Fuel supply lines are under pressure! Before removing a hose connection wrap a cloth around the connection. Then release pressure by carefully pulling the hose off the connection.

- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Fold rear seat bench forward.
- Remove cover from fuel delivery unit.
- Disconnect 4-pin connector as well as supply and return lines from flange (arrows).

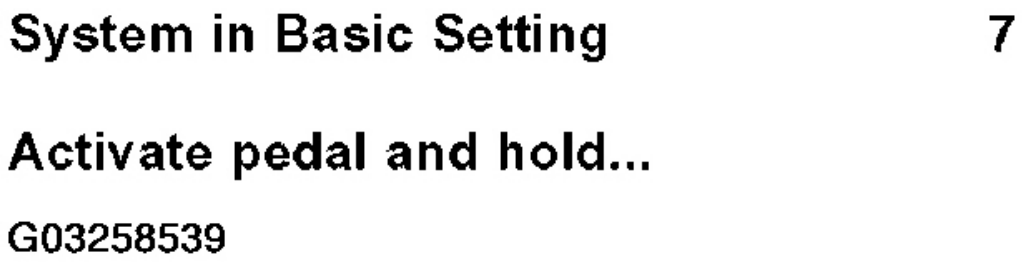

Fig. 12: Disconnecting 4-Pin Connector, Supply And Return Lines From Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Press buttons on hose couplings to disconnect.

- Seal lines to avoid contamination of fuel system.
- Remove union nut with spanner 3217.

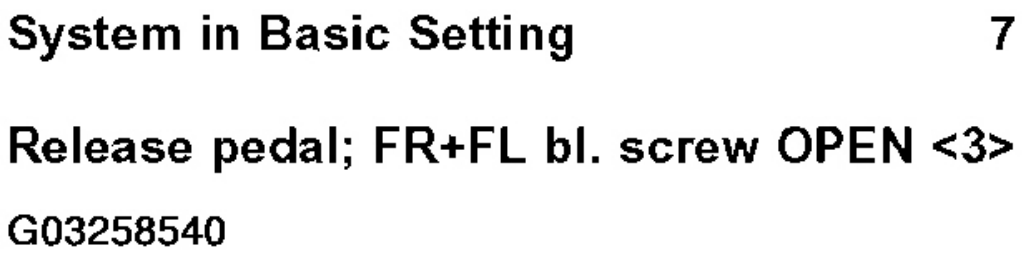

Fig. 13: Removing Union Nut With Spanner
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull fuel delivery unit and seal out of opening in fuel tank.

NOTE: **If the delivery unit is to be replaced then drain old delivery unit before disposal.**

Installing

Installation of the fuel delivery unit is performed in reverse order.

NOTE:

- **Insert seal for fuel delivery unit flange "dry" into opening of fuel tank.**
- **Moisten seal with fuel only when installing fuel delivery unit flange or fuel delivery unit.**
- **When inserting fuel delivery unit be careful to ensure that the fuel gauge sender does not become bent/deformed.**
- **Note installed position of flange of fuel delivery unit: Marking on flange must align with marking on fuel tank (arrows).**

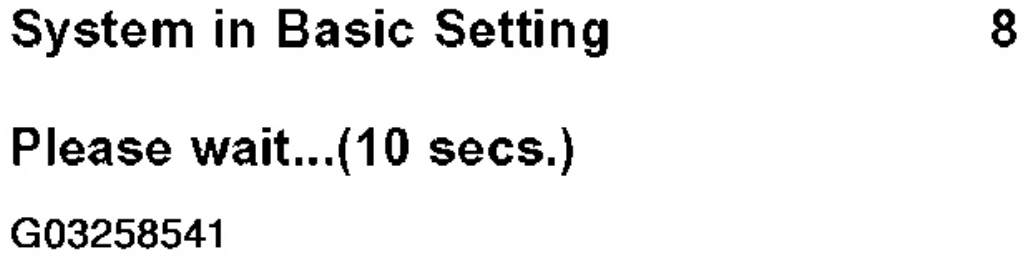

Fig. 14: Connecting 4-Pin Connector, Supply And Return Lines From Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- **Ensure tight fit of fuel hoses.**
- **After installing the fuel delivery unit, check that the supply, return and vent lines are still clipped onto the fuel tank.**

- Adapt (match) engine control module to throttle valve control module. See **COMPONENTS AND FUNCTIONS, ADAPTING** .
- If fault memory has been erased or engine control module was disconnected from permanent positive,

adapt respective components to engine control module (see **COMPONENTS AND FUNCTIONS, ADAPTING**), and generate readiness code again.

FUEL GAUGE SENDER, REMOVING AND INSTALLING

Removing

- Install fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .
- Release and disconnect terminals for wires -3- and -4-.
- Lift retaining tabs -1- and -2- with a screwdriver and pull fuel gauge sender out downward (arrows).

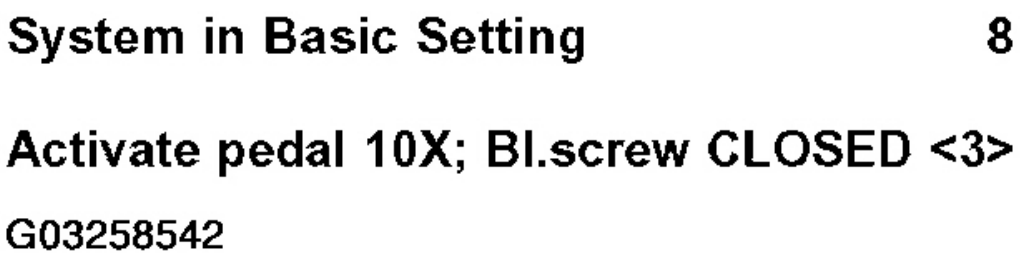

Fig. 15: Removing And Installing Fuel Gauge Sender
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

- Insert fuel gauge sender in guides on fuel delivery unit and push up until it engages.
- Install fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

FUEL TANK, REMOVING AND INSTALLING

Special tools, equipment, testers, measuring instruments and auxiliary items required

- V.A.G 1383 A Engine/transmission jack

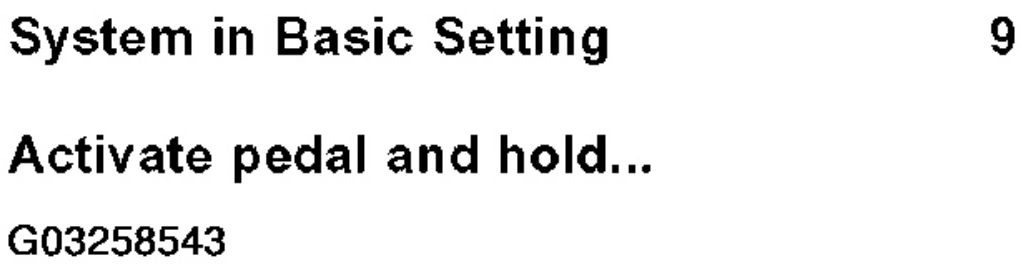

Fig. 16: Identifying V.A.G 1383 A Engine/Transmission Jack
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1331 Torque wrench (5-50 N.m)

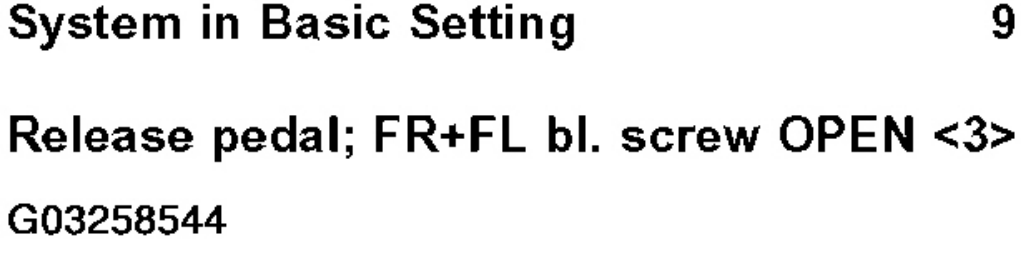

Fig. 17: Identifying V.A.G. 1331 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

NOTE:

- **Observe safety precautions before starting work. See SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM .**
- **Fuel extraction unit VAS 5190 is recommended to empty the fuel tank.**

- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Open fuel flap.
- Remove rear axle:

See **AXLE BEAM** .

- Remove right rear wheel housing liner:

  See **REAR WHEEL HOUSINGS LINER, ASSEMBLY OVERVIEW** .

- Remove cover for fuel tank (arrows).

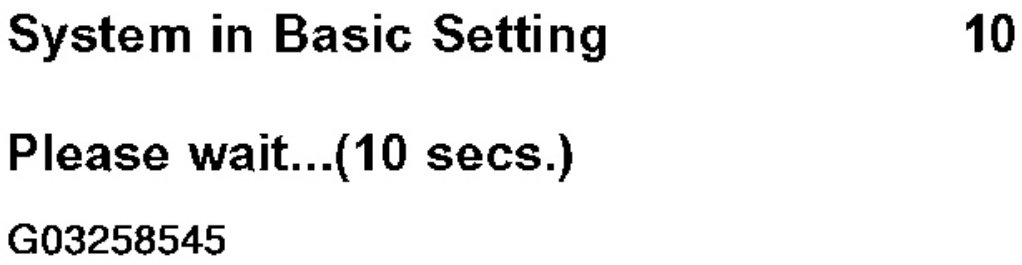

Fig. 18: Removing Fuel Tank Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Drain fuel tank, clean fuel filler neck and surrounding area.
- Disconnect breather lines/hoses on filler neck.
- Remove mounting screw and remove tank flap unit with rubber cup.

  See **FUEL TANK FILLER FLAP UNIT, REMOVING AND INSTALLING** .

- Pull EVAP canister breather lines off.
- Unhook gravity valve.
- Remove securing bolt on filler neck.
- Fold rear seat bench forward.

WARNING: Fuel supply lines are under pressure! Before removing a hose connection wrap a cloth around the connection. Then release pressure by carefully pulling the hose off the connection.

- Remove cover from under fuel tank.
- Remove cover from fuel delivery unit.
- Remove 4-pin connector from flange (arrow).

WARNING: Fuel supply lines are under pressure! Before removing a hose connection wrap a cloth around the connection. Then release pressure by carefully pulling the hose off the connection.

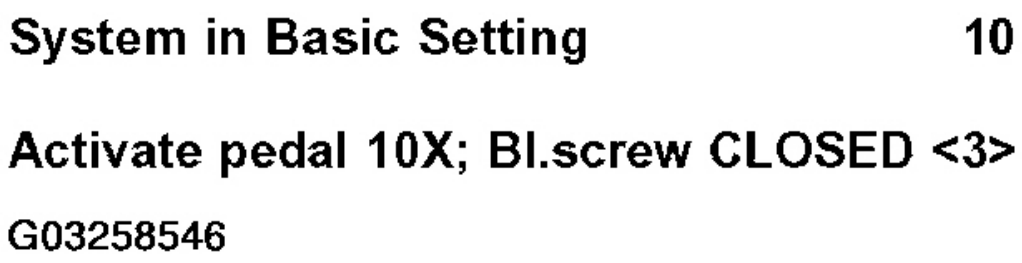

Fig. 19: Removing 4-Pin Connector From Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Disconnect return hose -2- (blue), supply hose -1- (black) and breather hose -3- (white) at connecting point.

NOTE: Press buttons on hose couplings to release.

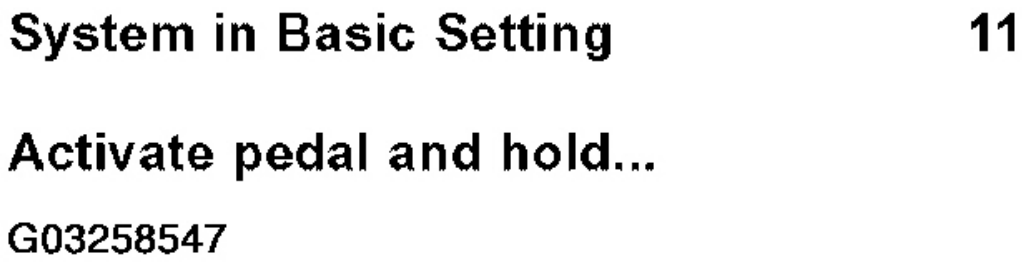

Fig. 20: Disconnecting Return Hose, Supply Hose And Breather Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Seal lines to avoid contamination of fuel system.
- Remove tensioning strap. When doing this support fuel tank with engine/transmission jack V.A.G 1383 A.

- Lower fuel tank. Guide breather hoses/lines through longitudinal member while lowering tank.

Installing

Install in reverse sequence. Note the following points:

- Route breather and fuel hoses kink free.
- Ensure tight fit of fuel hoses.
- Guide breather hoses/lines through opening in longitudinal member (install line guide).
- Secure breather hoses/lines to filler neck with spring-type clamp.
- Do not interchange supply and return hoses (return hose blue or blue markings, supply hose black).

NOTE: After installing fuel gauge sender, check that the supply, return and breather lines are still clipped onto the fuel tank.

- Adapt (match) engine control module to throttle valve control module. See **COMPONENTS AND FUNCTIONS, ADAPTING** .
- If fault memory has been erased or engine control module was disconnected from permanent positive, adapt respective components to engine control module (see **COMPONENTS AND FUNCTIONS, ADAPTING**) and generate readiness code again.

GROUND STRAP FOR REPLACEMENT FUEL TANKS, INSTALLING

Condition

All replacement fuel tanks do not come with Ground strap (wire) installed.

Installing

NOTE: The Ground strap must be installed into all replacement fuel tanks.

CAUTION: Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.

Install Ground strap Part No. 1J0 201 184 into replacement fuel tank as follows:

- Remove fuel filler cap and observe cautions printed on cap.
- Bend up tab on inside of fuel filler pipe as shown (arrow).

NOTE: Fig. 21 shows Ground strap already installed.

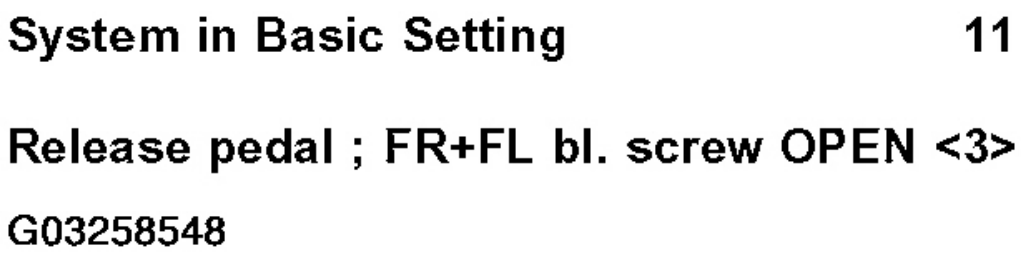

Fig. 21: Bending Up Tab On Inside Of Fuel Filler Pipe
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert end -A- of Ground strap through slot in tab up to bend -B- at other end of strap.

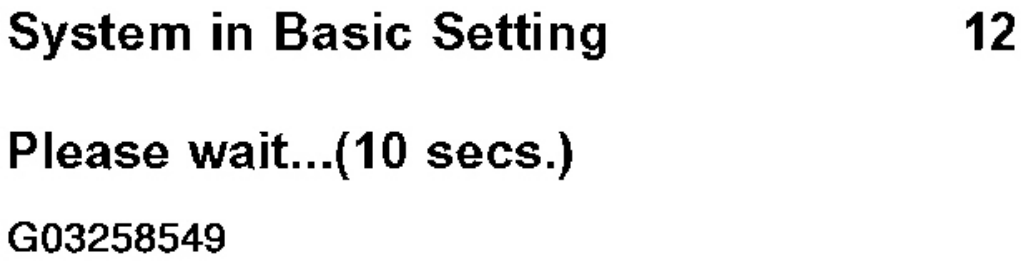

Fig. 22: Identifying Ground Strap
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Bend down tab on inside of fuel filler pipe. This will secure strap to end of tab.
- Reinstall fuel filler cap.

CRASH FUEL SHUT-OFF

Function

Models with an airbag are equipped with a crash fuel shut-off system. This system reduces the danger of a fire in a crash in that the fuel pump is switched off via the fuel pump relay. At the same time this system improves starting of the engine. When the door is opened the fuel pump is activated for 2 seconds to build up pressure in the fuel system.

When opening the fuel system:

- Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .
- Check activation of fuel pump relay using wiring diagram and V.A.G 1466 A: See appropriate SYSTEM WIRING DIAGRAM article.

FUEL PUMP, CHECKING

Special tools, equipment, testers, measuring instruments and auxiliary items required

- 3217 Union nut spanner
- V.A.G 1318 Pressure gauge
- V.A.G 1318/11 Adapter
- V.A.G 1318/16 Hose adapter
- V.A.G 1318/17 Adapter
- V.A.G 1318/23 Adapter

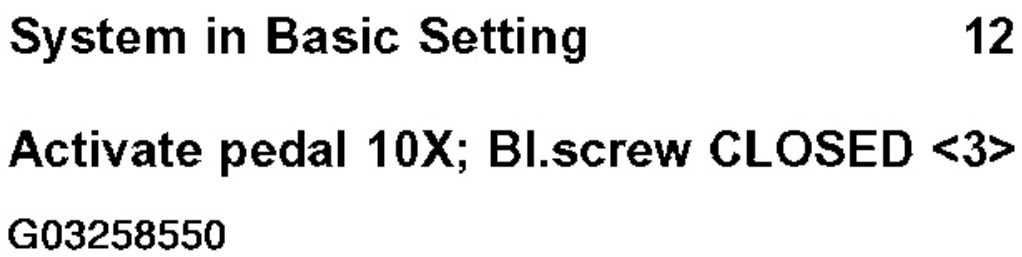

Fig. 23: Identifying Special Tools
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- V.A.G 1332 Torque wrench (40...200 N.m)
- V.A.G 1348/3A Remote control with adapter cable V.A.G 1348/3-2
- V.A.G 1527 B Diode test lamp
- V.A.G 1594 A Adapter set
- V.A.G 1715 Multimeter
- Measuring container
- Wiring diagram

Requirements

- Fuse 28 must be OK.

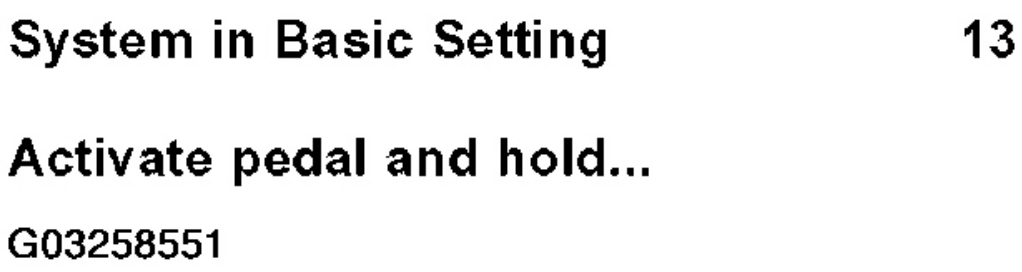

Fig. 24: Locating Fuse Box (Behind Access Panel At Far Left End Of Dash)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defogger must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- On models with an automatic transmission selector lever in position "P" or "N"

NOTE: Observe description of function of crash fuel shut-off. See CRASH FUEL SHUT-OFF .

Checking function and voltage supply

- Remove cover from fuel delivery unit.
- Briefly operate starter; fuel pump must be audibly starting.
- Switch off ignition.

If the fuel pump does not run:

- Remove cover in front of fuse holder.
- Pull fuse No. 28 out of fuse holder.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 to contact 28a to fuel pump and battery positive (+).

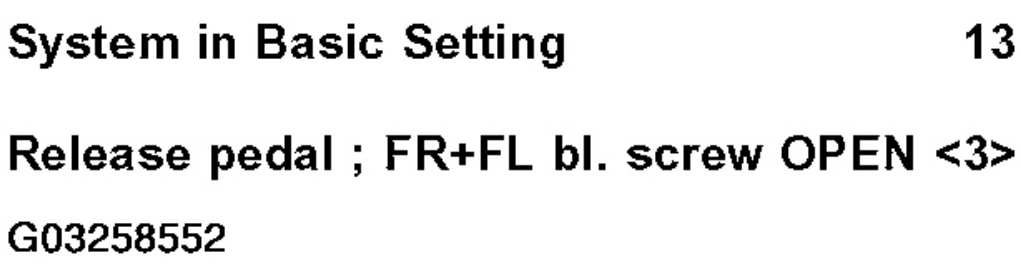

Fig. 25: Connecting Remote Control V.A.G 1348/3A To Fuel Pump Fuse Contact
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate remote control.

If fuel pump runs:

- Check activation of fuel pump relay referring to wiring diagram:

  See appropriate SYSTEM WIRING DIAGRAM article.

If fuel pump does not run:

- Remove 4-pin connector from flange (arrow).

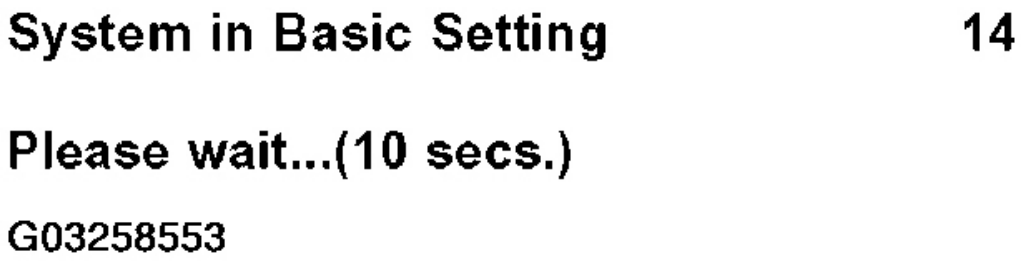

Fig. 26: Removing 4-Pin Connector From Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect diode test lamp V.A.G 1527 B with adapter cables from V.A.G 1594 A to outer contacts of

connector.

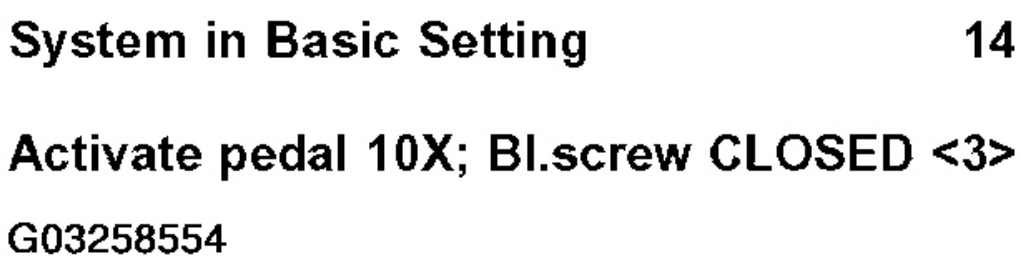

Fig. 27: Connecting Diode Test Lamp To Outer Contacts Of 4-Pin Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate remote control. LED must light up.

LED does not light up:

- Locate and eliminate open circuit referring to current flow diagram:

  See appropriate SYSTEM WIRING DIAGRAMS article.

LED lights up (voltage supply OK):

- Remove union nut with spanner 3217.

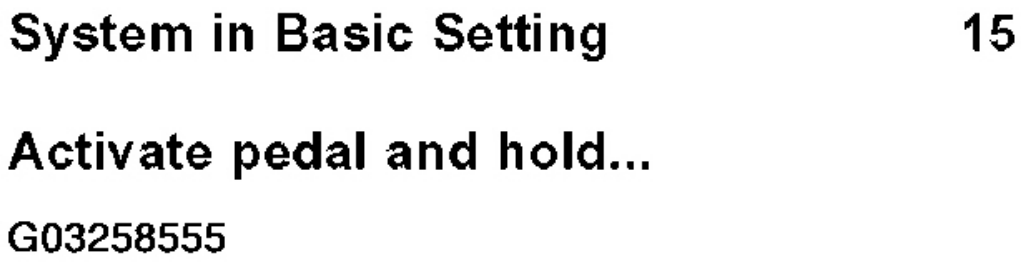

Fig. 28: Removing Union Nut With Spanner
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check that electrical wires between flange and fuel pump are connected.

If no open circuit can be found:

- Fuel pump faulty, replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

Checking delivery rate

Requirements

- Voltage supply OK
- Remote control V.A.G 1348/3A connected

Work sequence

- Remove filler cap from fuel tank filler neck.

> **WARNING: The fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.**

- Pull off supply hose -3- (with white marking) (engine codes BEV, BGD: black markings) and collect fuel that leaks out with a cloth.

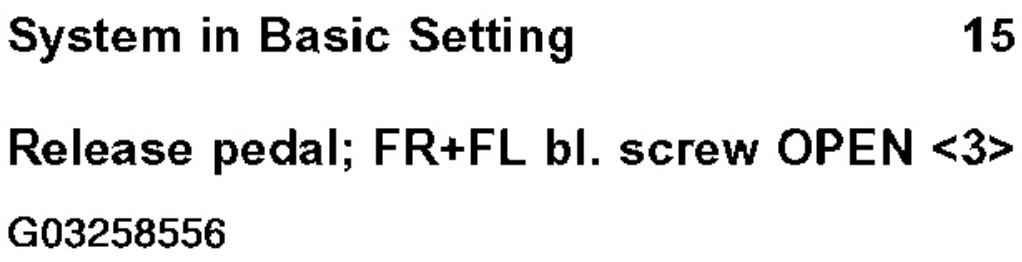

Fig. 29: Removing Fuel Supply Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Press locking ring inward to release fuel line.

- Connect pressure gauge V.A.G 1318 with adapter V.A.G 1318/23 and V.A.G 1318/17 to fuel supply line.

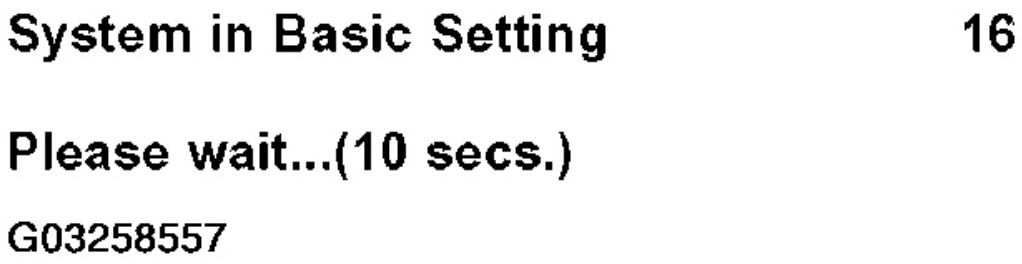

Fig. 30: Connect Pressure Gauge To Fuel Supply Line
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Push hose V.A.G 1318/16 onto adapter V.A.G 1318/11 on pressure gauge and hold hose in a measuring container.
- Open shut-off tap on pressure gauge. Lever then points in flow direction -A-.
- Operate remote control V.A.G 1348/3A. Close cut-off tap slowly, until pressure gauge shows 3 bar (except engine codes BEV and BGD). From now on do not alter setting of cut-off tap.

  For engine codes BEV and BGD: 3.5 bar

- Empty measuring container.

The quantity of fuel delivered by the fuel pump depends on the battery voltage. Therefore:

- Connect multimeter to vehicle battery using adapter cables from V.A.G 1594 A.
- Operate remote control for 30 seconds and measure battery voltage.
- Compare quantity of fuel delivered with nominal value.

NOTE: The following list refers to items in Fig. 31 .

*) Minimum delivery cm^3 /30 seconds

**) Voltage at fuel pump with engine at rest and pump running (approx. 2 volts less than battery voltage).

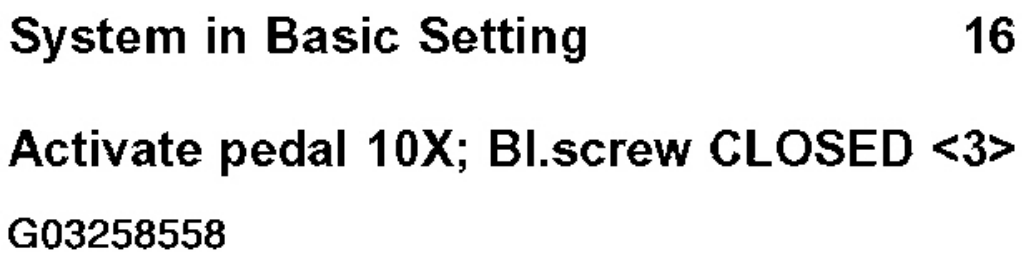

Fig. 31: Fuel Pump Delivery Reference Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Example: During the test, a voltage of 12.5 volts is measured on the battery. As the voltage at the pump is approx. 2 volts less than the battery voltage, the result is a minimum delivery of 200 cm^3 /30 s.

If the minimum delivery rate is not attained:

- Check fuel lines for possible restrictions (kinks) or blockages.
- Pull fuel line -1- off input side of fuel filter.

NOTE: Press locking ring inward to release fuel line.

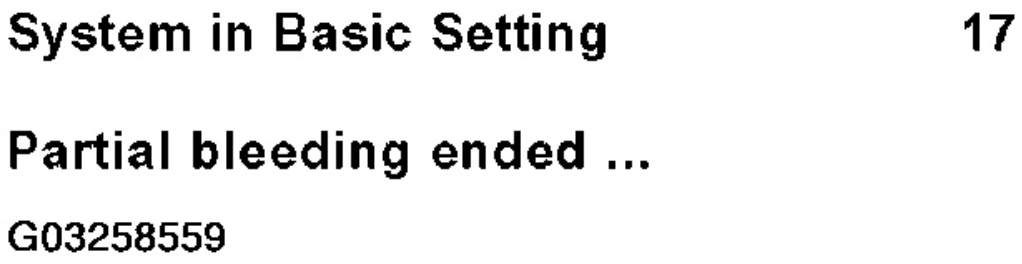

Fig. 32: Connecting Pressure Gauge With Adapter 1318/17 To Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect pressure gauge V.A.G 1318 with adapter 1318/17 to hose.
- Repeat delivery rate check.

If the minimum delivery rate is now attained:

- Replace fuel filter.

If the minimum delivery rate is again not attained:

- Remove fuel delivery unit and check strainer for soiling.

Only if no faults have been detected up to now:

- Fuel pump is faulty; replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

If the delivery rate has been attained but a fuel supply system fault (e.g. intermittent failure of fuel supply system) is still suspected:

- Check current draw of fuel pump as follows:
- Reconnect all disconnected fuel lines.
- Disconnect 4-pin connector from flange on fuel delivery unit.
- Set multimeter to measuring range 20 A and make a series connection between connector contacts -1- and fuel pump using adapter cables from V.A.G 1594 A.

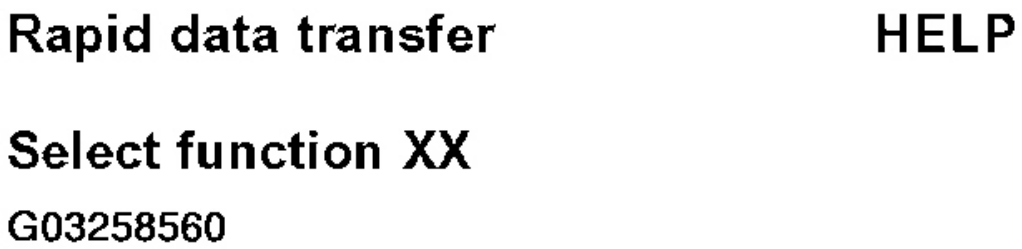

Fig. 33: Connecting Multimeter In Series Between Connector Contacts And Fuel Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The current clamp of multimeter V.A.G 1715 can be connected between contacts -1- of connector and fuel pump, as an alternative solution.

- Bridge contact -4- of connector and fuel pump using adapter cables from V.A.G 1594 A.
- Start engine and run at idling speed.
- Measure current draw of fuel pump.

Specification: max. 8 amps

NOTE: If the fuel system malfunction is intermittent, perform the check during a road test with the help of a 2nd technician.

If the current draw is exceeded:

- Fuel pump is faulty; replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

Checking fuel pump non-return valve

Requirements

- Remote control V.A.G 1348/3A is still connected
- Pressure gauge V.A.G 1318 is still connected

Work sequence

NOTE: With this check the fuel supply line connections from the fuel delivery unit to the point at which the pressure gauge V.A.G 1318 is connected will be checked for leaks at the same time.

- Close pressure gauge cut-off tap (lever across flow direction, position -B-).

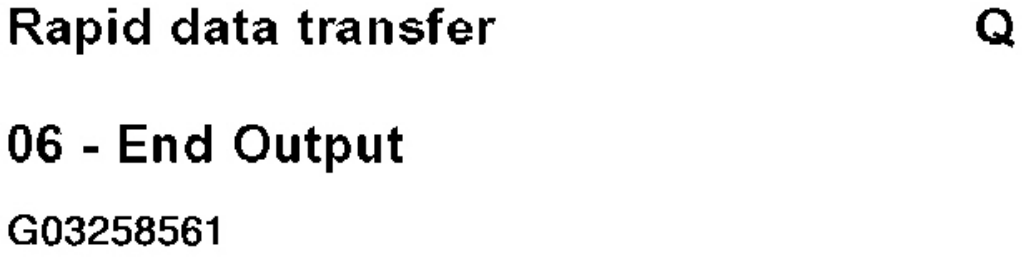

Fig. 34: Checking Fuel System Pressure Drop
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate remote control at short intervals, until a pressure of approx. 3 bar has built up.

WARNING: Danger of spray when opening the shut-off-tap; hold container in front of the free connection on the pressure gauge.

- If pressure builds up too high, lower excess pressure by carefully opening shut-off tap.
- Observe pressure drop on gauge.

  Over a duration of 10 minutes pressure must not drop below 2.5 bar

If the pressure drops further:

- Check line connections for leaks.

If no wiring fault is detected:

- Fuel pump is faulty; replace fuel delivery unit. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING** .

FUEL SYSTEM, BLEEDING

Engine codes BEV, BGD

Special tools, equipment, testers, measuring instruments and auxiliary items required

- V.A.G 1348/3 A Remote control
- V.A.G 1348/3-2 Adapter cable
- VAS 5226 Diesel suction pump
- V.A.G 1318/20 Adapter
- V.A.G 1318/20-1 Adapter

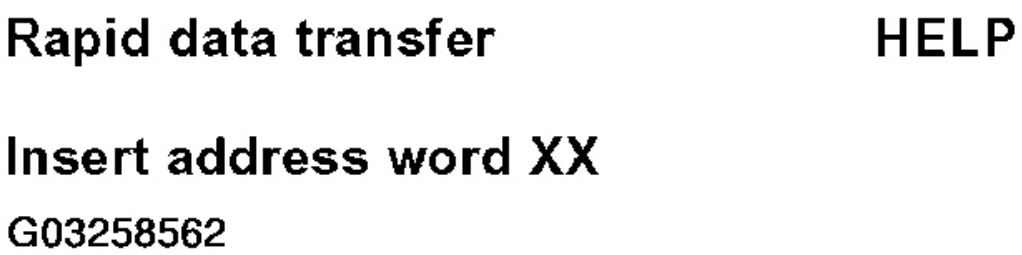

Fig. 35: Identifying Special Tools
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Requirements

- Fuses must be OK

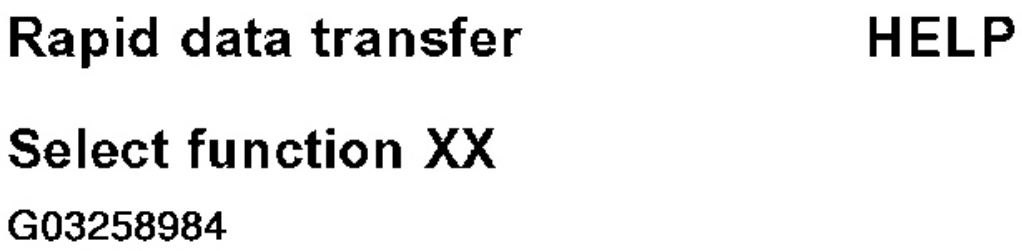

Fig. 36: Locating Fuses (Behind Access Panel At Far Left End Of Dash)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Battery voltage must be at least 11.5 V
- Fuel pump relay must be OK

Work sequence

- Remove cover in front of fuse holder.
- Pull fuse No. 28 out of fuse holder.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 to contact 28a to fuel pump and battery positive (+).

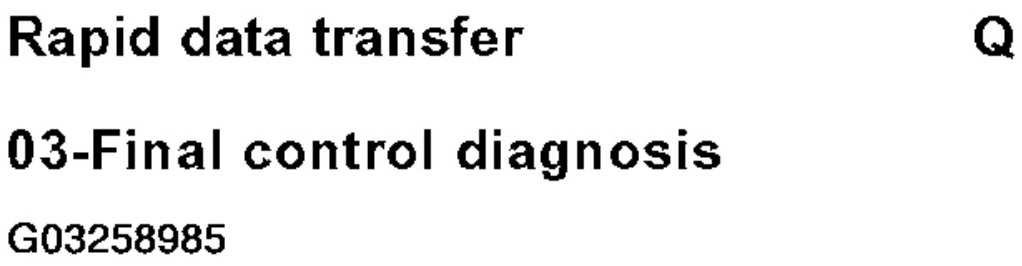

Fig. 37: Connecting Remote Control V.A.G 1348/3A To Fuse Box Fuel Pump Contact
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove pressure hose from secondary air injection pump to combination valve.
- Unscrew cover cap (arrow) of breather valve.

Fig. 38: Removing Breather Valve Cover Cap Screw
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Screw adapter V.A.G 1318/20-1 onto adapter V.A.G 1318/20.

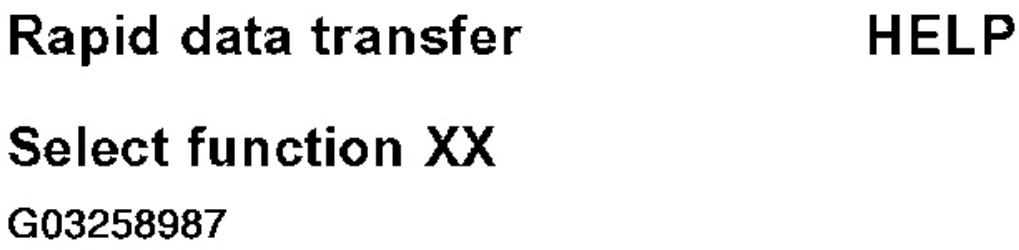

Fig. 39: Identifying V.A.G. 1318/20-1 & V.A.G. 1318/20
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Turn valve (at T-piece) counterclockwise until it is completely open.
- Screw adapter V.A.G 1318/20 hand tight onto breather valve.

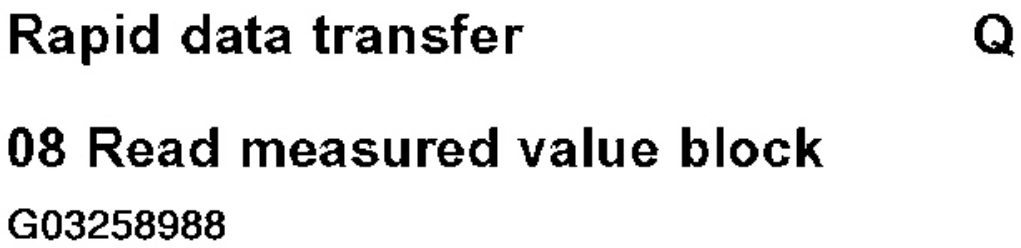

Fig. 40: Screwing Adapter V.A.G 1318/20 Hand Tight Onto Breather Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect hose of diesel suction pump VAS 5226 as shown.
- Turn valve (at T-piece) clockwise into breather valve onto limit stop.
- Check adapters and hose connectors for leaks.
- Operate remote control V.A.G 1348/3A until bubble-free fuel comes out of breather valve.
- Turn valve (at T-piece) counterclockwise again until it is completely open.
- Clamp-off hose of diesel suction pump VAS 5226 (e.g. with hose clamp 3094) and disconnect it from adapter V.A.G 1318/20-1.
- Unscrew adapter V.A.G 1318/20 from breather valve.

ACCELERATOR MECHANISM, SERVICING

ACCELERATOR MECHANISM, COMPONENT OVERVIEW (ENGINE CODE AEG)

NOTE: The following list refers to items in Fig. 41 .

1. **Accelerator cable**
   - Adjusting. See **ACCELERATOR CABLE, ADJUSTING**
   - Do not reuse damaged accelerator cable, replace
2. **Retaining clip**
   - Adjusting accelerator cable. See **ACCELERATOR CABLE, ADJUSTING**
3. **Vibration damper**
4. **Accelerator pedal**
5. **Spacer sleeve**
6. **Bearing socket**
7. **Washer**
8. **Stop bolt**

9. **20 N.m**

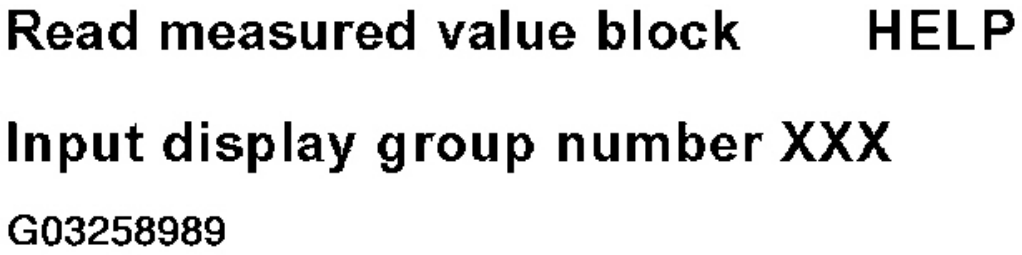

Fig. 41: Exploded View Of Accelerator Mechanism
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ACCELERATOR CABLE, ADJUSTING (ENGINE CODE AEG)

Vehicles with manual transmission

Special tools, equipment, testers, measuring instruments and auxiliary items required

- V.A.G 1788/10 Engine speed regulator

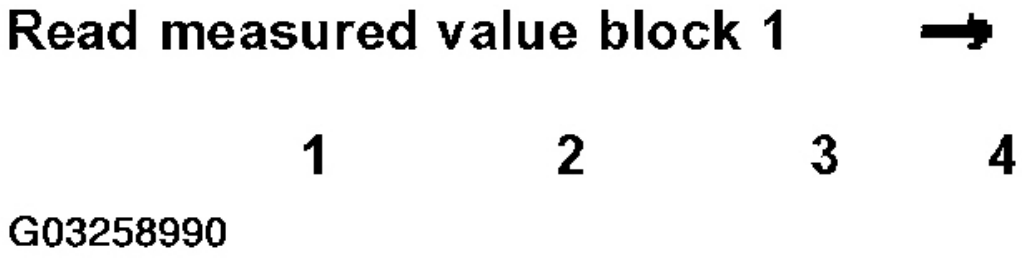

Fig. 42: Identifying V.A.G 1788/10 Engine Speed Regulator
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Work sequence

- Hook accelerator cable into accelerator pedal and cam plate of throttle valve control module.

- Pull off retaining clip for accelerator cable.
- Depress accelerator pedal fully to wide open throttle position.

NOTE: Assistance of a second technician is required or support accelerator pedal against steering wheel using V.A.G 1788/10 speed regulator.

- Adjust accelerator cable by moving retainer on support bracket, so that wide open throttle position is attained on cam plate of throttle valve control module.

Vehicles with automatic transmission

Special tools, equipment, testers, measuring instruments and auxiliary items required

- V.A.G 1788/10 Engine speed regulator
- Hand multimeter V.A.G 1526 A or multimeter V.A.G 1715
- Adapter set V.A.G 1594

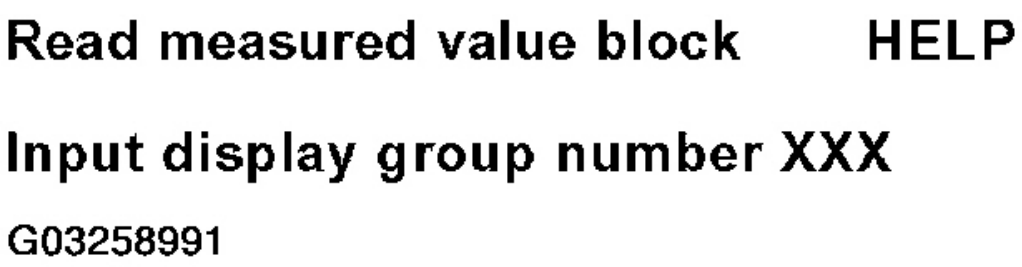

Fig. 43: Identifying Special Tools
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Work sequence

- Adjust accelerator cable by moving retainer on support bracket so that wide open throttle position is attained on cam plate of throttle valve control module.
- Release accelerator pedal.
- Pull 2-pin connector off Kick down switch -F8- in front engine compartment (on bulkhead).
- Connect hand multimeter V.A.G 1526 A with auxiliary cables from V.A.G 1594 to kick down switch.

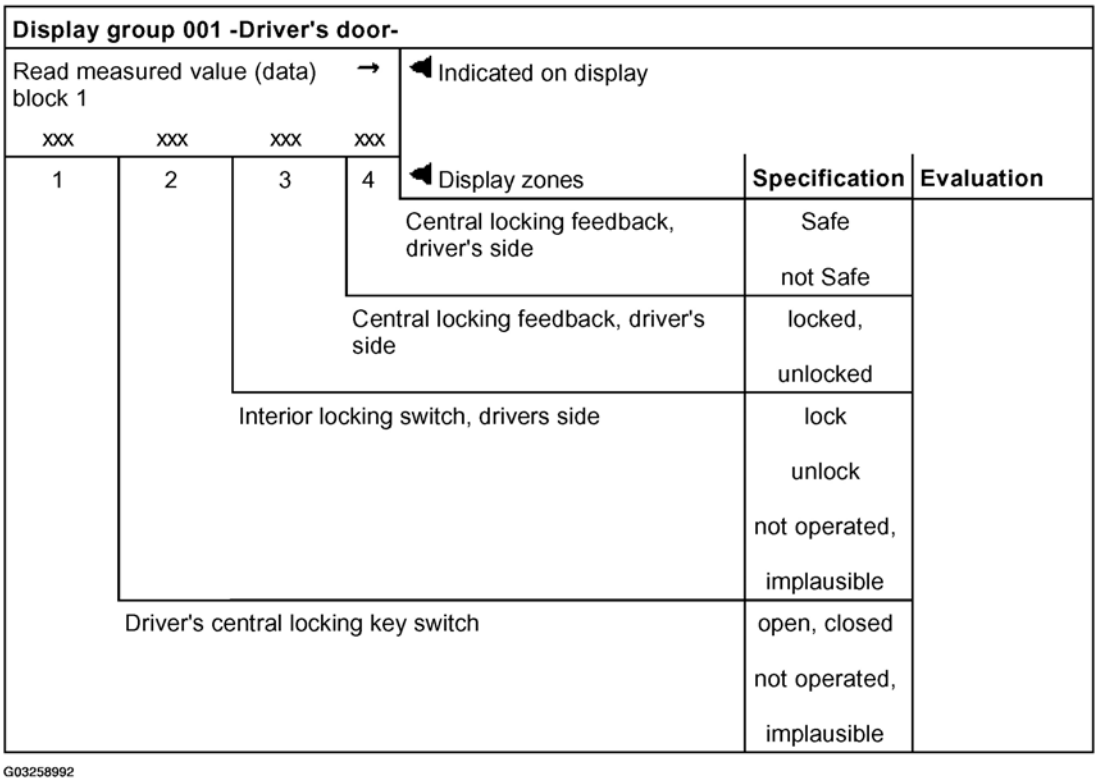

Fig. 44: Measuring Kick Down Switch Resistance
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure resistance at switch

  Specification: "INFINITY" ohms.

- Press accelerator pedal slowly to floor.

  Shortly after kick down switch point resistance must drop at 0 ohm

  Accelerator pedal must be at point just before limit stop

- Adjust accelerator cable by moving retainer on support bracket, so that throttle valve is fully open and kick-down switch clicks audibly.
- Release accelerator pedal or remove speed regulator.
- Once adjustments are complete check idling and wide open throttle limit stops on throttle valve.

ELECTRONIC POWER CONTROL (EPC)

ENGINE CODES AVH, AZG, BDC, BEV, BGD

NOTE: The following list refers to items in Fig. 45 .

1. **Mounting**
2. **Connector**
   - Black, 6-pin
3. **10 N.m**
4. **Throttle Position (TP) sensor -G79- and Sender -2- for accelerator pedal position -G185-**
   - On replacement, for models with automatic transmission, an adaptation must be performed. See **COMPONENTS AND FUNCTIONS, ADAPTING** .
   - When removing remove instrument panel/pedal cluster cover
5. **Retainer**
   - For footwell cover
   - Clipped onto accelerator pedal

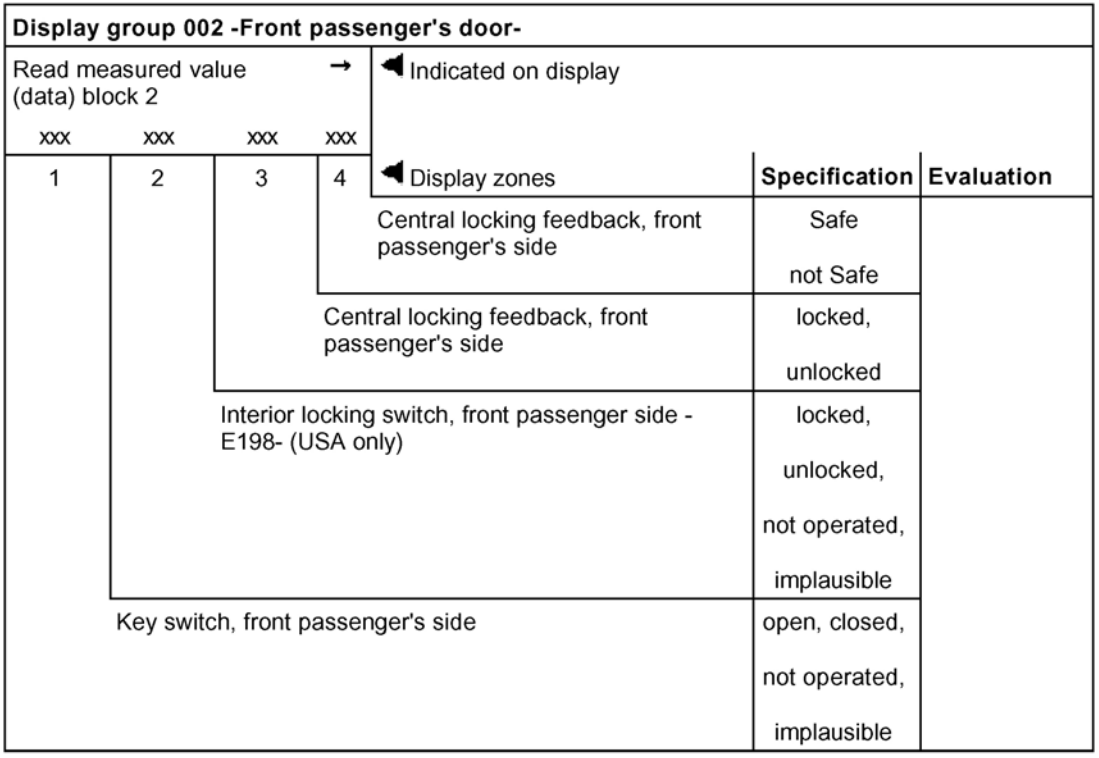

Fig. 45: Exploded View Of Electronic Power Control (EPC) Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

FUNCTION OF EPC SYSTEM

With the EPC system the throttle valve is not operated by the throttle pedal via a cable. There is no mechanical

connection between accelerator and throttle valve.

The position of the accelerator is transmitted to the engine control module by two accelerator position senders (variable resistors; mounted in one housing) which are connected to the accelerator pedal.

The position of the accelerator (drivers requirement) is the main input value for the engine control module.

The throttle valve is operated over the complete revolution and load range by an electric motor (throttle valve positioner) in the throttle valve control module.

The throttle valve is operated by the throttle valve positioner which is controlled by the engine control module.

When the engine is not running and the ignition is switched on the engine control module moves the throttle valve exactly as prescribed by the accelerator pedal position sender. This means that when the accelerator is depressed halfway the throttle valve positioner opens the throttle valve by the same amount, the throttle is then approximately half open.

When the engine is running (under load) the engine control module can open or close the throttle valve independently of the accelerator pedal position sender.

This means that the throttle valve can already be completely open even though the accelerator pedal is depressed half way. This also gives vastly improved consumption and exhaust emission levels at certain load conditions.

After evaluating the torque requirements of various components (e.g. air conditioning system, automatic transmission, ABS/ESP and so on), the engine control module calculates the optimal throttle valve opening angle for the respective situation.

This also gives vastly improved fuel consumption and exhaust emission levels at certain load conditions.

EPC is a system comprising all components which contribute to determining, controlling or monitoring the position of the throttle valve, e.g. accelerator pedal position sender, the throttle valve control module, the EPC warning lamp, the engine control module and so on.

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

EVAPORATIVE EMISSIONS (EVAP) SYSTEM

FUNCTION

Depending on air pressure and ambient temperature, fuel vapor will form above the level of fuel in the tank.

The EVAP system prevents these HC emissions from escaping into the atmosphere.

In limited quantities, fuel vapors located at the highest point in the tank pass through a gravity valve (which closes at an angle of 45°) and through a pressure retention valve into the EVAP canister.

The activated charcoal in the canister stores these vapors like a sponge.

When the oxygen sensor control is active when driving (engine warm), the EVAP canister purge regulator valve -N80- is activated (pulsed) from the engine control module depending upon load and engine speed. The opening period is dependent on the input signals.

Intake manifold vacuum draws fresh air through the vent opening on the underside of the EVAP canister during the purging procedure (regenerating the activated charcoal). The fuel vapors stored in the activated charcoal and fresh air are fed for combustion in dosed quantities.

The pressure retention valve prevents fuel vapors from being drawn from the tank when the solenoid valve is open and an intake manifold vacuum is present. It therefore ensures that the evacuation of the EVAP canister has priority.

When no voltage is applied (e.g. wiring open circuit), the solenoid valve is closed. The EVAP canister will not be purged.

The vacuum line from the throttle valve control module to the EVAP canister has an additional bypass which is connected with the crankcase breather valve. The non-return valve integrated in the crankcase breather valve prevents the intake air gassing into the crankcase during some partial load ranges. This improves the overall crankcase breathing. The bypass guarantees the crankcase breathing.

Functional description of leak diagnosis

The EVAP system (including the fuel tank) is equipped with a leak diagnosis. This diagnosis system detects leaks in breather system.

This diagnosis is based on the pressure principle and should detect leaks with a circumference larger than 1 mm.

During the diagnosis the Leak Detection Pump (LDP) -V144- creates a pressure of 30 mbar in the EVAP system. When the pressure is attained the pump switches off. If the pressure drops below a predetermined value the pump switches on again. The self-diagnosis monitors the switching periods and sets a fault in the fault memory when the period is too short.

Observe safety precautions. See **SAFETY PRECAUTIONS WHEN WORKING ON THE FUEL SUPPLY SYSTEM** .

Observe rules for cleanliness. See **RULES FOR CLEANLINESS** .

EVAP system components, servicing. See **EVAP SYSTEM COMPONENTS, SERVICING** .

EVAP system, assembly overview. See **EVAPORATIVE EMISSIONS (EVAP) SYSTEM, ASSEMBLY OVERVIEW** .

NOTE:

- **Hose connections are secured with either spring-type or clamp-type clips.**
- **Always replace clamp-type clips with spring-type clips.**
- **Always replace clamp-type clips with spring-type clips. Assembly tool VAS 5024 or hose clip pliers V.A.G 1921 are recommended for installing spring-type clips.**

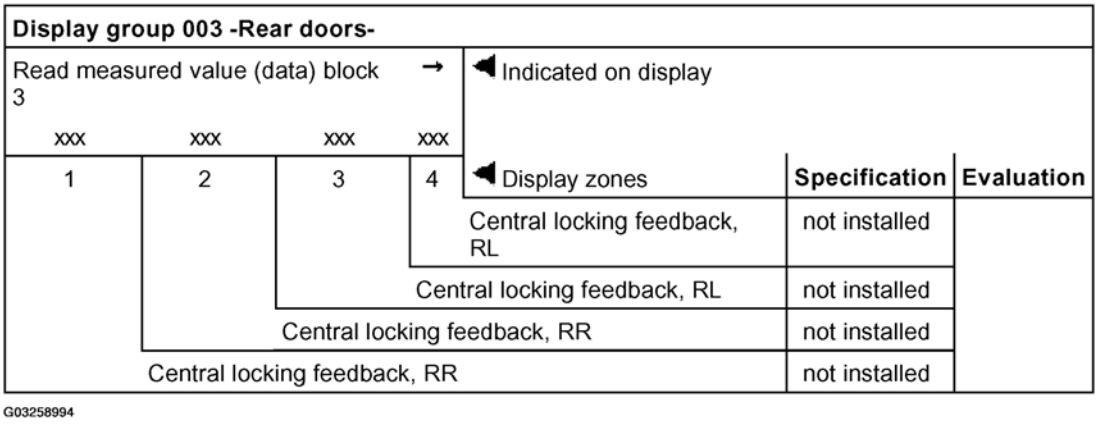

Fig. 46: Identifying Special Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

EVAP SYSTEM COMPONENTS, SERVICING

NOTE: **The following list refers to items in Fig. 47 .**

- **Components marked with an * are checked by the self-diagnosis.**

  See Diagnostic tester VAS 5051; Vehicle self-diagnosis

- **Components marked with ** are checked by the final control diagnosis.**

  See Diagnostic tester VAS 5051; Vehicle self-diagnosis

NOTE: **The following list refers to items in Fig. 47 .**

1. **Leak Detection Pump (LDP) -V144-*/****
   - In right rear wheel housing, behind wheel housing liner
2. **Connector**
   - Black, 3-pin
3. **Vacuum line**
   - To intake manifold upper part. See **Fig. 49** , item -6-.

- Press together at front to release

4. **Breather pipe**
   - Black
   - Check if seated securely
   - From changeover valve on fuel tank. See **ENGINE CODES BEV, BGD** , item -14-
   - Press together at front to release
5. **To EVAP canister purge regulator valve -N80-**
   - White
   - Check if seated securely
   - To EVAP canister purge regulator valve -N80-.
6. **EVAP canister**
   - In right rear wheel housing, behind wheel housing liner
   - To remove and install, remove turn signals
7. **10 N.m**
8. **2 N.m**
9. **Air filter for leak detection pump**
10. **Connecting hose**
    - Suction side
11. **Connecting hose**
    - Pressure side

Display group 004 -Central control unit-

Read measured value (data) block 4 → Indicated on display

xxx	xxx	xxx		Display zones	Specification	Evaluation
1	2	3	4			
				Empty[1)]		
				Rotary latch switch, rear	not installed	
				Rotary latch switch, front passenger's side	door open, door closed	
				Rotary latch switch, driver's side	door open, door closed	

[1)] Empty means in this case: Display zone is blank

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Fig. 47: Exploded View Of EVAP System Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

EVAPORATIVE EMISSIONS (EVAP) SYSTEM, ASSEMBLY OVERVIEW

Engine codes AEG, AVH, AZG

- Engine code BDC. See **ENGINE CODE BDC**
- Engine codes BEV, BGD. See **ENGINE CODES BEV, BGD**

NOTE: The following list refers to items in Fig. 48 .

1. **Tank flap unit**
   - With rubber cup
2. **Fuel tank**
   - When removing, support with engine/transmission jack V.A.G 1383 A
     - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
3. **Fuel delivery unit**
   - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
4. **Throttle valve control module -J338-**
5. **Intake manifold upper part**
6. **Fuel rail with injectors**
7. **Fuel pressure regulator**
8. **Fuel filter**
   - Installed position: Arrow points in direction of flow
9. **EVAP canister purge regulator valve -N80-**
   - On right in engine compartment above wheel housing liner
   - Installed position: Arrow points in direction of flow
   - Valve will be activated by engine control module (pulsed)
10. **Test union**
11. **Gravity valve**
12. **Pressure retention valve**
    - For fuel tank breather
    - Checking. See **Checking Pressure Retention Valve**
13. **Change-over valve**
    - Check. See **Checking Change-Over Valve**
14. **EVAP canister**
    - In right rear wheel housing, behind wheel housing liner
15. **Leak Detection Pump (LDP) -V144-**
    - At EVAP canister
    - Pump will be activated by engine control module (pulsed)
16. **Air filter for LDP**

Display group 005 -Central control unit-						
Read measured value (data) block → 5				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	**Specification**	**Evaluation**
				Interior monitor sensor	yes no not installed	
				Remote control unit key button	open, closed, RLR[1], Panic[2] (with 0 or 1)	
				Speed signal (Steps: 2 km/h)	mv 0 km/h (Steps: 2 km/h)	
				Central locking temperature switch-off	yes, no	

[1] Only vehicles for USA, RLR= Rear lid Remote release

[2] Only vehicles for USA, alarm system and turn signal lights are activated

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Fig. 48: Hose Routing Diagram Of Evaporative Emissions (EVAP) System (Engine Codes AEG, AVH, AZG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Engine code BDC

NOTE: The following list refers to items in Fig. 49 .

1. **Tank flap unit**
2. **Fuel tank**
   - When removing, support with engine/transmission jack V.A.G 1383 A
     - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
3. **Fuel delivery unit**
   - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
4. **Intake hose**
5. **Throttle valve control module -J338-***
6. **Intake manifold upper part**
7. **Fuel rail with injectors**
8. **Fuel pressure regulator**

9. **Fuel filter**
    - Installed position: Arrow points in direction of flow
10. **EVAP canister purge regulator valve -N80-*/****
    - On right in engine compartment above wheel housing liner
    - Installed position: Arrow points in direction of flow
    - Valve will be activated by engine control module (pulsed)
11. **Test union**
    - Not installed on all models
12. **Gravity valve**
13. **Pressure retention valve**
    - For fuel tank breather
    - Checking. See **Checking Pressure Retention Valve**
14. **Change-over valve**
    - Check. See **Checking Change-Over Valve**
15. **EVAP canister**
    - In right rear wheel housing, behind wheel housing liner
16. **Leak Detection Pump (LDP) -V144-*/****
    - In right rear wheel housing, behind wheel housing liner
    - Valve will be activated by engine control module (pulsed)
17. **Air filter for leak detection pump**

Display group 006 -Central control unit-

Read measured value (data) block 6 →

xxx	xxx	xxx	xxx	◄ Indicated on display		
1	2	3	4	◄ Display zones	**Specification**	**Evaluation**
				Ignition	Terminal 15 on, Terminal 15 off	
				Tailgate key switch	open, closed, not operated implausible	
				Key number[1)]	0,1, 2, 3, 4	
				S-terminal	operated, not operated	

[1)] Display 1 for remote control key 1 is performed by operating a button on remote control key

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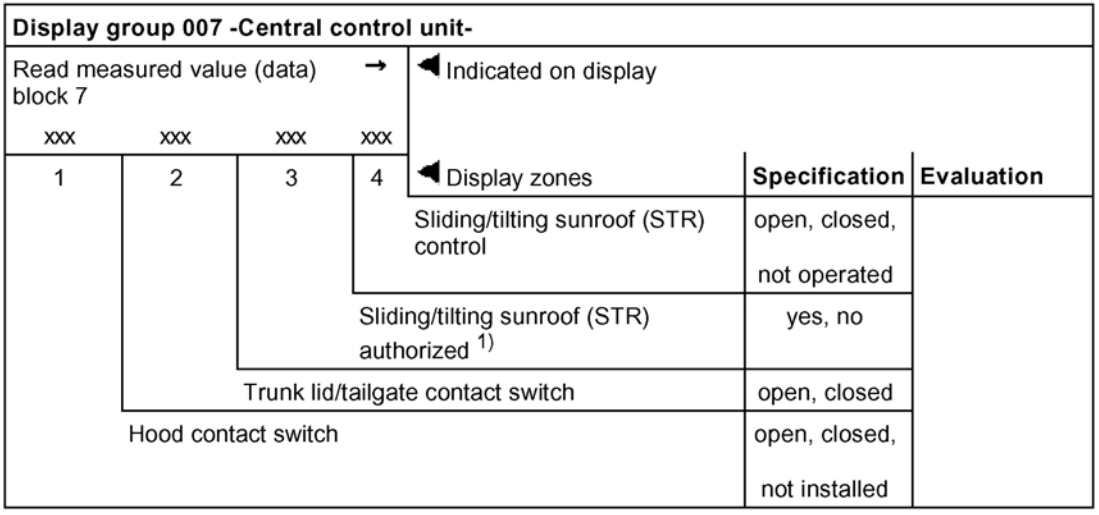
Fig. 49: Hose Routing Diagram Of Evaporative Emissions (EVAP) System (Engine Code BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Engine codes BEV, BGD

NOTE: The following list refers to items in Fig. 50 .

1. **Tank flap unit**
2. **Fuel tank**
   - When removing, support with engine/transmission jack V.A.G 1383 A
     - Removing and installing. See **FUEL TANK, REMOVING AND INSTALLING**
3. **Fuel delivery unit**
   - Removing and installing. See **FUEL DELIVERY UNIT, REMOVING AND INSTALLING**
4. **Intake hose**
5. **Throttle valve control module -J338-**
6. **Intake manifold upper part**
7. **Fuel rail with injectors**
8. **Fuel filter**
   - Installed position: Arrow points in direction of flow
   - With fuel pressure regulator
9. **EVAP canister purge regulator valve -N80-**
   - On right in engine compartment above wheel housing liner
   - Installed position: Arrow points in direction of flow
   - Valve will be activated by engine control module (pulsed)
10. **Gravity valve**
11. **Pressure retention valve**
    - For fuel tank breather
    - Checking. See **Checking Pressure Retention Valve**
12. **Change-over valve**
    - Check. See **Checking Change-Over Valve**
13. **EVAP canister**
    - In right rear wheel housing, behind wheel housing liner
14. **Leak Detection Pump (LDP) -V144-**
    - In right rear wheel housing, behind wheel housing liner
    - Valve will be activated by engine control module (pulsed)
15. **Air filter for leak detection pump**



Display group 007 -Central control unit-

Read measured value (data) block 7 →

◀ Indicated on display

xxx	xxx	xxx	xxx	◀ Display zones	Specification	Evaluation
1	2	3	4	Sliding/tilting sunroof (STR) control	open, closed, not operated	
				Sliding/tilting sunroof (STR) authorized 1)	yes, no	
				Trunk lid/tailgate contact switch	open, closed	
				Hood contact switch	open, closed, not installed	

1) The control unit sends a "switch-off delay" terminal 15 to sliding/tilting sunroof. Therefore the operation of the sliding/tilting sunroof is still possible, after switching off the ignition, and until a door is opened.

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Fig. 50: Hose Routing Diagram Of Evaporative Emissions (EVAP) System (Engine Codes BEV, BGD)
Courtesy of VOLKSWAGEN OF AMERICA, INC.